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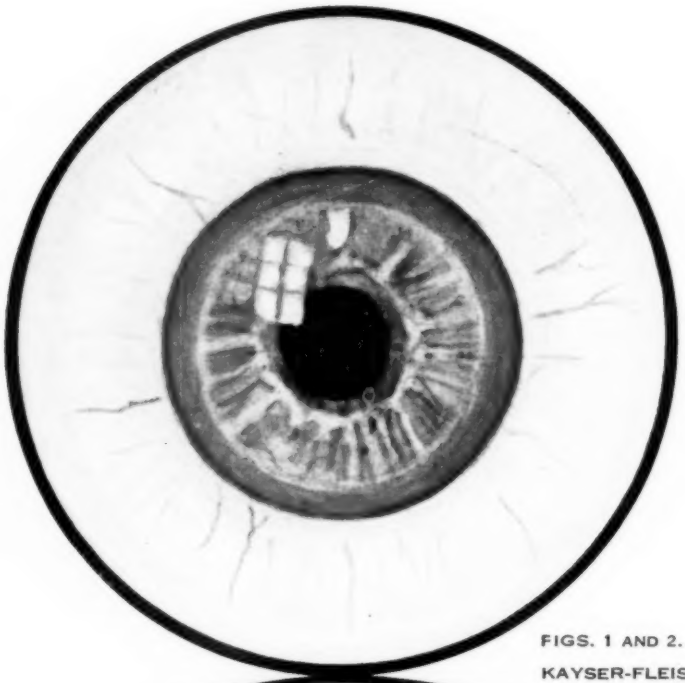

FIG. 1

FIGS. 1 AND 2.

KAYSER-FLEISCHER RING.
(DAVID L. POE)

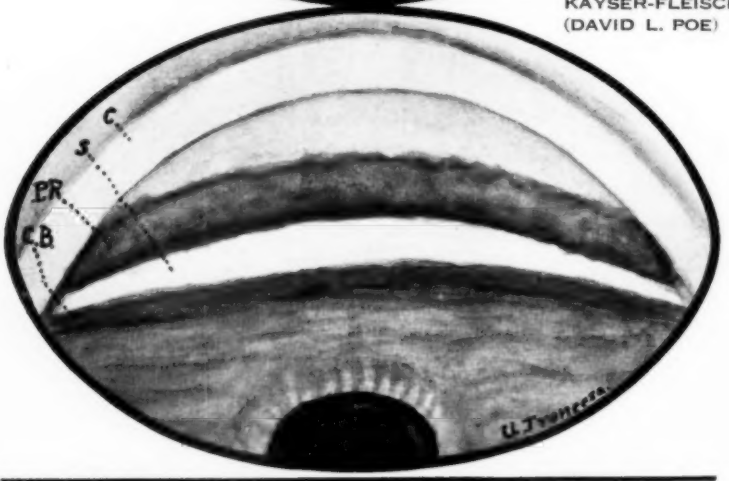

FIG. 2

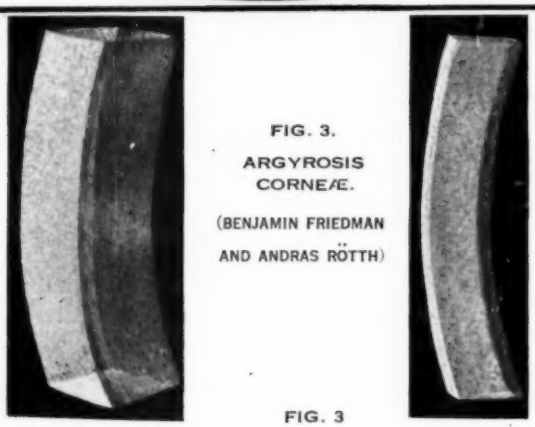

FIG. 3.

ARGYROSIS CORNEÆ.

(BENJAMIN FRIEDMAN AND ANDRAS RÖTTH)

FIG. 3

AMERICAN JOURNAL OF OPHTHALMOLOGY

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KAYSER-FLEISCHER RING IN THE CORNEA IN A CASE OF WILSON'S DISEASE

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NEW YORK

A case is here presented in which the characteristics of the Kayser-Fleischer ring were studied during the progress of a disease which is similar to those described by Wilson in 1912 under the title of "Progressive lenticular degeneration: a familial nervous disease associated with cirrhosis of the liver". The appearance of the ring is described from examinations made with the slit-lamp and the gonioscope. The writer speculates on the origin of the pigment material which is found in the cornea and the lenticular nucleus.

Through the courtesy of the department of neurology of Cornell University Medical College I have been able to observe and study a case of Wilson's disease for about two years. On December 17, 1928 I had the privilege of presenting this patient before the New York Ophthalmological Society.

C. S., male, twenty-one years of age, mechanical helper by trade. Family history negative. The patient had the usual infantile diseases, but from about the age of ten to seventeen years he was healthy and strong.

When between eighteen and nineteen years old he commenced feeling slight rheumatic pains, and was not quite as strong physically as formerly. He had some diarrhea about that time, but not of such severity as to require medical attention. As he was becoming steadily weaker and unable to perform the physical labor demanded of him without becoming excessively tired, he sought successively medical, osteopathic and chiropractic aid

When he presented himself at the hospital for admission because of a progressive rigidity, his neurological symptoms, which suggested an involvement of the cerebral basal ganglia, were already markedly advanced. Since the writer first saw him about two months after admission, it becomes necessary to refer to entrance notes as follows:

Neurologic status: typical facies; muffled speech; coarse rhythmic tremor of all extremities, but particularly of the right upper; pill rolling position of fingers; carriage somewhat stiff; sluggish pupils; a few nystagmoid jerks in the horizontal and vertical planes; poor convergence; tongue and mouth rather moist; and unable to close mouth well.

While making the eye examination, the writer observed a circular brownish-green pigmentation which extended around the cornea at the limbus; it resembled the Kayser-Fleischer ring of the Westphal-Strümpell pseudosclerosis or Wilson's hepatolenticular degeneration. (Frontispiece, figure 1.)

By slit-lamp examination the pigmentation was found to be located in the deep layers of the cornea, that is, in Descemet's membrane. It was brownish-green at the limbus, becoming golden in the cornea and fading off into yellow in its central part. By higher magnification it was found that the pigmentation was not homogeneous in its entire extent, but here and there it showed evidences of granulation. The pigmented ring was 2.5 mm. broad and no clear corneal substance was seen between it and the limbus.

The pupillary reactions were somewhat sluggish to light and to convergence. The refracting media and the fundi were clear. There were at times slight nystagmoid jerks when the eyes were rotated to the extreme left or right. These were, however, not constant. The findings were practically uniform in both eyes.

Dr. M. Uribe Troncoso kindly made a gonioscopic examination of the patient's eyes on October 25, 1928, and the report is quoted in its entirety: "The angle of the anterior chamber is normal and open in both eyes. (See frontispiece, figure 2.) The iris is of a greenish color. The band of the ciliary body appears reddish violet and is clearly separated from the inner part of the scleral band, which is uniformly white. At the lower border of insertion of the cornea into the sclera, begins a ring of a peculiar light brown greenish pigment which extends about two or three mm. into the tissues of the cornea, toward its center.

"The pigment ring is separated from the inner scleral limbus by a clear-cut, slightly wavy line, and on account of the bias of the cornea the pigmentation reduces the width of the scleral band. The corneal pigmentation has a more saturated darker greenish color near the sclera, and becomes lighter toward the center, where it ends by an indistinct margin. The ring is continuous and uniform all around the corneal limbus.

"The gonioscopic examination has been important for determining the extent of the ring inside, showing that it is confined to the limbus corneæ, while the sclera, iris and other structures are entirely free from pigment."

The examination of the discoloration of the cornea at the limbus left no doubt in our minds that we were dealing with a Kayser-Fleischer ring.

Kayser was the first to make such findings public, while in the following year Fleischer published a more detailed study of similar observations. The peculiar discoloration thereafter became known by both names. The findings made by both investigators were in cases known clinically as pseudosclerosis.

The reported details by Fleischer consisted in brief of the following statements: A strange brownish-green opacity appeared in the deep layers of the cornea, Descemet's membrane, close to the limbus and is approximately two millimeters broad. Histologically, the opacity consisted of very fine irregularly round and pointed nuclei of about 0.8 microns; their color was greenish-brown-black, and, when the micrometer screw was set in a given adjustment, they possessed a certain shimmer. The nuclei had their seats on the endothelium of Descemet's membrane. Between the bases of the endothelial cells and the nuclei was a pigment-free normal substance. The lamina basalis of the choroid also contained similar pigment. The chemical examination was made without arriving at any definite conclusions.

Siemerling and Oloff (Klinische Wochenschrift, 1922, volume 1, no 22), describes a sunflower-like opacity in the lens in addition to the corneal pigmentation found in their case of pseudosclerosis. It is interesting to note that the corneal opacity was one or two millimeters distant from the limbus and had a breadth of two millimeters. It consisted of a brownish-green ring lying in the deepest layers of the cornea. This pigmentation was bilateral. In both eyes, particularly in the right, they observed a delicate bluish-gray opacity located in the anterior part of the lens; it could be seen only with reflected light. The center was somewhat lighter than the periphery, and the opacity had the appearance of a sunflower; it resembled a Purtscher pseudocataract.

The Purtscher pseudocataract consists of a very delicate shimmering membrane situated in the anterior layer of the capsule of the lens; it is visible by oblique but not by direct illumination. Even under the microscope this membrane shows a very delicate structure. With oblique illumination one can see a shimmering reflex of rainbow colors with the red-green components predominating. This reflex, as well as the lenticular opacity, is invisible when the eye is examined by direct light. Purtscher described this type of pseudo-opacity of the lens as pathognomonic of the presence of copper in the eye. A number of subsequent findings have borne out his observation.

We searched diligently for similar opacities in the lenses in our patient but found none. Another difference, worthy

of note, between Siemerling and Oloff's patient and ours lies in the fact that in their report the opacity lay one to two millimeters distant from the limbus, while in the cornea of our patient no clear space existed between the limbus and the pigmentation.

The question of what biochemical processes occur in this disease and produce these changes in the media of the eye remains as unanswered as when the condition was first observed.

A large number of clinical observers are of the opinion that the material producing the corneal changes in hepatolenticular degeneration represents derivatives of substances which are washed into the circulation in the course of cirrhotic destruction of the liver. These same substances that act on the ocular tissues in all probability are responsible for the degenerative processes that take place in the lenticular nucleus of the cerebrum.

While post mortem findings of the Westphal-Strümpell pseudosclerosis and Wilson's hepatolenticular degeneration have all shown cirrhosis of the liver, and while cirrhosis of the liver has come to be recognized as a cardinal phenomenon belonging to this disease, it has as yet eluded the clinicians in their attempts to establish the presence of hepatic degeneration during the life of the patient.

Since the breakdown of the hepatic organ is accepted as a sine qua non of this malady, we have sought to establish this fact by means of laboratory tests. Examination of urine and blood at the New York Postgraduate Medical School and Hospital laboratory gave us the following data:

October 15, 1928:
- Hemoglobin 17.6
- Nonprotein N 30.7
- Uric acid 2.0
- Urea N 12.0
- Creatinin 2.9
- Amino-acid N 6.8
- Fibrin 0.25
- Sugar 0.081

Remarks:
- Icterus index 8.0
- Van den Bergh direct ....negative
- Van den Bergh indirect ....faintly positive

October 22, 1928:
- Hemoglobin 14.9
- Nonprotein N 31.9
- Uric acid 3.3
- Urea N 11.1
- Creatinin 4.3
- Amino-acid N 7.2
- Fibrin 0.25
- Sugar 0.072

Urine 1650 c. c.
Urobilin 24 mg. per 100 c.c.

Dr. John A. Killian, who supervised the tests, stated that in his opinion the examinations definitely showed an increase in the icterus index and in the Van den Bergh tests. Tests done elsewhere did not always agree with the above findings; this indicates that the increase in the icteric index was not constant.

If there is an increase of biliary substance in the circulating media, what bearing might it have upon the corneal tissue in the production of the so-called Fleischer ring?

Salzmann, in his book on anatomy and histology of the human eyeball, discusses the histology and staining qualities of the corneal tissues.

In the periphery Descemet's membrane is bathed anteriorly and posteriorly by the aqueous. This is the region of the anterior border ring of Schwalbe. Descemet's membrane normally has a staining reaction different from that of the corneal stroma. "Even with eosin a slight difference is made out, and this is still plainer with the Van Gieson's stain: the stroma appears deep fuchsin-red, and the Descemet's membrane rose-red to orange-yellow." "Most striking, however, is the difference after staining for elastic fibers with orcein or resorcin-acid-fuchsin, for then the stroma is without stain, and Descemet's membrane dense brown or violet; yet the stain is by no means as intense as it is in the case of elastic fibers or in the intima of arteries."

Toxic substances, resulting from a breakdown of the liver tissue, which

may have a tendency to raise the icteric index, are swept into the fluid media of the body. These may be irregularly produced, and may occur in the minutest quantities; but when these toxic substances are secreted into the aqueous humor and remain in contact with the tissues in question anteriorly and posteriorly, a biochemical reaction may take place with Descemet's membrane, for which tissue they perhaps have a predilection, thus ultimately resulting in what is clinically known as the Kayser-Fleischer ring.

The vestibular reactions of our patient were definitely increased above the normal. When 5 c.c. of water at 13 ° C. was introduced into the external auditory canal there ocurred a latent phase of fifteen seconds, and then a nystagmus to the opposite side would set in and increase in intensity to the point where the patient would show a third degree type; the intensity would then subside and the nystagmus eventually disappear. The nystagmus would last two and one quarter to two and one half minutes. Both vestibular nerves reacted to the caloric test when separately examined.

This observation is recorded because the writer does not recall having seen any mention made of the vestibular nerve reactions in hepato-lenticular degeneration.

The cochlear divisions of the eighth nerves in our patient appeared normal in their physiological function.

Other neurological symptoms observed in our patient that are of interest clinically are noted in the following remarks.

Mentally our patient was quite docile, euphoric, and cooperative, he possessed no delusions or hallucinations, but had a general restriction of the mental horizon.

Physically there was a marked tremor which at times was coarse, with long excursions so that the patient was practically unable to attain the mark which he was aiming at with either the finger or the toe. The coarseness and severity of the tremors were variable; at one time they would be of much milder form than at another. When they were of a milder character the patient could attain the mark aimed at much more easily. There were times when he could walk unaided with long stiff strides, but with the body bent slightly forward and rigidly held. He could walk only with some swaying, and could not walk a straight line. At other times he would be confined entirely to bed, because of inability to stand unaided. On one occasion he attempted to get out of bed alone, and he fell against a heated radiator. When confined to his bed he had to be fed since he was unable to bring food or drink to his mouth.

The face constantly showed a characteristic expression; it was immobile and stiff. There was no fine play of expression as we observe in the normal person. The face was involved on both sides, which caused a constant peculiar smile. Occasionally he would have spasmodic outbursts of laughter. The eyelids were held wide open. The ocular rotations were singularly restricted in their excursion. It required an additional effort to innervate the movements of the eyes, and the effort fatigued him. The mouth was at all times open, and the tongue was held up against the hard palate with the tip between the teeth.

The arms were rotated inward. The hands and fingers were held in the money counting posture, and there were constant movements of the thumbs and fingers. The legs were extended at all the joints, the feet were over-extended in talipes equinovarus and the toes were flexed. At times the spasm at the hips involved the flexors, so that the extended legs were raised off the bed. There was considerable coarse tremor of the legs, especially during all intention movements. The muscles were all hypertonic.

Observation of the patient during sleep showed the tremor almost imperceptible, mouth open and tongue held interdental. Passive movements of the arms and legs disclose hypertonicity. Breathing was quiet and regular. Contractures were persistent. The musculature of the patient showed no evidence of emaciation. Appetite is good.

The affection from which this patient is suffering is unquestionably a hepatolenticular degeneration, which Wilson classically described. Wilson in his thesis failed to mention the corneal discoloration. Whether this was due to having been overlooked, or because it did not exist in his cases, is difficult to say. Nevertheless, the corneal pigmented ring has come to be recognized as a cardinal sign in this disease.

Palpation of the liver was attempted frequently, but on account of the rigidity of the abdominal muscles no satisfactory conclusions could be formulated. Inspection of the body in bright daylight on several occasions gave the impression that the skin showed evidence of a slight icteric color.

During the regular course of examination our patient mentioned that his sister also had a ring in her eyes. Since this disease has a tendency to affect more than one member of a family, we hastened to examine the sister; her corneal rings proved to be arcus senilis, and otherwise she appeared to be quite healthy.

The illustration of the Kayser-Fleischer ring was done by the writer in colors directly from the patient's eyes.

Conclusion

1. The object of this paper is to call attention to the characteristics of a Kayser-Fleischer ring.

2. It is regarded by many authorities as a pathogomonic sign in hepatolenticular degeneration.

3. Because of the similarity of a large number of clinical symptoms found in this disease and in chronic encephalitis, the former is frequently mistaken for the latter ailment.

4. A degenerative process of the liver exists in Wilson's disease and does not necessarily exist in chronic encephalitis, but as yet we have been unable to clinically establish the presence of a cirrhotic liver with any degree of certainty; therefore we must rely to a great extent upon the presence of a Kayser-Fleischer ring for a differential diagnosis.

5. Hepatolenticular degeneration is usually progressive and fatal. The span of life after the disease becomes established ranges from two to seven years, while in chronic encephalitis it is not necessarily progressive, or fatal in the same period of time.

120 West Fifty-eighth street.

ARGYROSIS CORNEÆ

BENJAMIN FRIEDMAN, M.D., NEW YORK
AND
ANDRÁS RÖTTH, M.D., BUDAPEST

In ten of the twelve cases of conjunctival argyrosis a corneal argyrosis was also seen with the slit-lamp. It was more marked at the limbus, less toward the center. The color varied from golden brown to ultramarine. The pigment layer was probably between Descemet's membrane and the epithelium. In some cases there was an argyrosis of the lens, seen as a yellowish reflex from the anterior capsule and as a diffuse yellowish coloring of the posterior capsule and the outermost layers of the posterior cortex. From the State Eye Hospital, Budapest, Professor Joseph Imre, Jr., director.

The occurrence of argyrosis of the conjunctiva is so frequent, especially in countries where trachoma is prevalent, that it attracts little attention, and perhaps for this reason a concomitant argyrosis of the cornea was long overlooked. The first slit-lamp picture of this condition was published in 1927 by Larsen in his description of a number of cases among silver workers. One has the opportunity of observing cases of argyrosis due to medication particularly among trachomatous patients in certain outpatient clinics, where it is customary to treat them over considerable periods of time with silver nitrate. We examined twelve such cases, and in every patient, except two in whom there was only a slight silver staining of the conjunctiva, a distinct golden to greenish blue coloration of the posterior corneal surface was observed. The bulbar conjunctiva, under the dirty grayish silver pigment, gave also a golden color, and there was in some cases a similar golden reflex from the anterior capsule. In others the posterior capsule and the subcapsular part of the posterior cortex were yellowish colored.

Case reports

The detailed description of two cases, one marked, the other mild, will serve to illustrate the two extremes of argyrosis corneæ and one may infer the variety of gradations found between the two.

Case 1: This patient, aged forty-one years, has had bilateral trachoma for seven years. During that time he has been using silver nitrate solution, two drops in each eye almost daily. No treatment with copper.

In gross appearance the conjunctiva of the lower lids is a dirty grey color especially in the nasal sectors. The lower fornix is very darkly stained. The upper lid conjunctiva is clear except for a slight argyrosis in the nasal quadrant. The bulbar conjunctiva is also a hazy grey and under the conjunctiva may be seen a distinct golden tint. The right cornea shows a crescentic area along the lower limbus about 1.5 mm. wide, which is darker than normal. There is slight pannus superiorly. The entire left cornea is "smoky" but much darker in the lower third, the transition being very gradual. Slight pannus is present superiorly. When first viewed the peripheral dark zone gives the impression that the underlying iris is more deeply pigmented. On oblique illumination the light transmitted through this portion of the cornea is a deep cherry red.

With the slit-lamp one sees that the conjunctiva of each eye shows argyrotic changes—very fine dark grey pigment granules in the superficial layers, the vessels standing out as a light network against the blackish background. The golden color of the bulbar conjunctiva is visible by retroillumination as a homogeneous tint. In the lower third of each cornea the deepest layers, including Descemet's membrane, are stained a deep gold color, more pronounced near the limbus and gradually fading above until in the middle of the cornea the posterior surface is a greenish blue. The pigmentation is homogeneous. Individual pigment granules

cannot be discerned. The upper third of the cornea is similarly colored gold, but less intensively and less extensively. The anterior capsule of each lens throws a very marked golden reflex which is more intense in the lower part of its periphery and gradually lessens towards the center. The posterior capsule and adjacent layers of the posterior cortex impart a golden glow most apparent by retroillumination. No opacities are present. The iris, vitreous and fundi are negative.

The cornea of this patient at the junction of the lower and middle third is shown in figure 3 of the frontispiece.

Case 2: This forty-four-year-old patient had bilateral trachoma with pannus. He had contracted trachoma at the age of eight years, first treated at age of ten; this was done on alternate days with silver nitrate solution and bichloride of mercury rubs for a half year. At twenty-four years of age he was treated with silver nitrate and alum for a short time. In 1916 and 1917, he was treated every third day for eighteen months with silver nitrate. In 1919, mercury ointment daily for ten weeks. In 1929, nearly daily treatment with adrenalin for many weeks. No copper treatment.

In gross appearance, the conjunctiva shows moderate argyrosis. A golden color is visible under a dirty grey of the silver precipitate. There is bilateral pannus of the cornea, but the color is natural.

With the slit-lamp one sees typical argyrosis of the conjunctiva. In the cornea there is a definite bluish-green coloration of the posterior surface, more intense inferiorly. Near the lower limbus the color is greener, near the center bluer. The upper third of the cornea cannot be judged properly because of the heavy pannus. The color under high magnification seems not absolutely homogeneous but rather stippled. The color nearly fades away when the broad beam is used, and is seen best when the narrow slit is employed. The upper part of the cornea is much less discolored. The lens and iris are negative. The vitreous and fundi are poorly seen but apparently negative.

Figure 4 of the frontispiece shows a section of this cornea at the junction of the lower and middle thirds.

Considering all cases the amount of coloring in the posterior corneal surface is roughly proportional to the amount of argyrosis present and the duration of treatment with silver. It has already been stated that there were two cases of slight argyrosis in which the cornea was normal. On the other hand, in one patient who had used two per cent silver nitrate daily for the first year of his sickness and every second day for the next six years, the gold color had infiltrated forwards into the parenchyma to two-thirds of its entire thickness.

That this condition is an argyrosis of the cornea is hardly to be doubted. Metzger, Stein, Steindorff, and Volmer demonstrated such cases in silver workers. Brückner describes argyrosis corneæ after local medication. In the second edition of his atlas Vogt describes a corneal argyrosis after internal medication. We thus see that silver, no matter how absorbed, may be deposited in the cornea. Larsen describes a "sunflower cataract" in the anterior capsule in a case of argyrosis corneæ. Metzger and Larsen, in cases with corneal involvement of long duration from occupational origin, also found changes in the vitreous and retina, and discoloration of the disc which they attributed to the silver absorption. In certain cases the vision and dark adaptation were affected. Steindorff found silver in the bulbus of silver workers and demonstrated silver in the cornea by means of the ultramicroscope. The viscera were free of silver.

Zur Nedden in 1906 produced opacities of the cornea experimentally with the heavy metals, and found that silver was precipitated as silver mucoid, and possibly as silver albuminate, carbonate and chloride. He could also distinguish a black silver precipitate in all these chemical combinations. The microscopy of argyrosis conjunctivæ was described in 1898 by Hoppe, who found

a dark pigmentation of the network of the subconjunctival tissue through the incrustation of its fibers and of the cement substance of the muscles of the vessels. The pigment also lay free in the tissues as fine and larger granules. Ewing, in 1912, found the vessels and lymph spaces of the papillæ strongly colored black, and saw deposits of brown and black granules in the adenoid layer.

Corneal pigmentation following exposure to other metals is not unknown. Bayer, in 1908, reported a tinting of the cornea in the lid spaces among chromium workers. The conjunctivæ were clear, the corneæ were colored brown with a yellow-red secondary tone.

Copper is also able to form corneal pigmentation, as Jess proved in 1922, in cases of intraocular foreign bodies of copper. He states that the fine layer of copper salt, probably copper carbonate, is between Descemet's membrane and the endothelium. Moschler and Sallmann also found the same condition in cases of copper medication. Jess and others found a "sunflower" cataract in the anterior capsule and the subepithelial region, and to a lesser degree in the posterior subcapsular layers. The slit-lamp picture of chalcosis corneæ is very similar to that of argyrosis corneæ.

Apparently the portion of the cornea most affected is the region chiefly in contact with the chemical. Following instillation of drops one would expect the cornea at the lower limbus to suffer most, at the upper limbus less and in the interpalpebral fissure least. The gold and greenish blue coloring are interference phenomena produced by the passage and reflection of light rays through the metallic film.

The slit-lamp findings in chalcosis corneæ and argyrosis corneæ both indicate that, while copper and silver solutions pass readily through the corneal stroma, the endothelium must have a vital quality which partly prevents these solutions from passing through, for we see a heavy deposition of these metal salts just in front of the endothelium. Sallman thinks also that because of impermeability of the endothelium there is a higher concentration of these salts near the endothelium with a consequent precipitation. Furthermore, Descemet's membrane may have a specific affinity for these salts. The same thing happens in the lens in argyrosis corneæ. The glass membrane allows the passage for the solution but the epithelium obstructs it. However, where there is no epithelium (posteriorly) the cortex also is tinged with a yellow color. In both cornea and lens, in strong cases, the precipitate between the cell layer and glass membrane seems to pile up from the cell layer towards the glass membrane.

One is struck by the similarity of the markings in argyrosis corneæ to the golden ring found in pseudosclerosis. Here the ring of Fleischer extends around the entire corneal periphery, sometimes with strong accentuation at the lower and upper limbus. In 1910, Fleischer described the ring in the eyes of patients suffering from an apparently atypical multiple sclerosis. Microscopically he found fine pigment granules, brown to black in color, especially in the sclerotic connective tissues, but also in the glass membrane of the choroid, in the pial covering of the brain and in the spleen. In 1929, Vogt succeeded in extracting large amounts of copper and silver from the spleen, liver and kidney of a pseudosclerotic patient. In addition, it is significant that he demonstrated silver in Descemet's membrane by microchemical methods.

Kubik, in a recent communication, throws doubt upon the validity of Vogt's methods in determining the presence of silver in the corneæ of these patients, suggesting that the pigment is an organic by-product. Vogt, in a later communication, vigorously opposes Kubik's view. Since the silver and copper deposits appear similar under the slit-lamp the thought suggests itself that some of the discoloration may be due to copper, particularly since Vogt found actual copper cataracts in pseudosclerosis. Both metals may contribute to the effect simultane-

ously. At any rate, we can say that the corneal pigmentation in pseudosclerosis, whatever its chemistry, looks like argyrosis corneæ.

Summary

In ten out of twelve cases of conjunctival argyrosis a corneal argyrosis was seen with the slit-lamp. Even moderate conjunctival argyrosis was accompanied by corneal argyrosis.

This condition is strongest at the limbus and diminishes towards the center and again becomes a little more pronounced at the upper limbus. The color variation between the strongest and the weakest cases may be a golden brown, yellowish gold, yellowish green, greenish blue or ultramarine. The pigment layer appears in most cases to be finely stippled and lies at the posterior surface of the optical section, probably between Descemet's membrane and the endothelium. In more pronounced cases it piles up forwards.

There is in some cases also an argyrosis of the lens. It appears as a yellowish reflex from the anterior capsule, and as a diffuse yellowish coloring of the posterior capsule and the outermost layers of the posterior cortex.

The scleral conjunctiva is tinged with gold in nearly all cases.

771 West End avenue (Friedman).

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LATENT HETEROPHORIA AS NOTED AFTER PROLONGED MONOCULAR OCCLUSION

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OMAHA

In some cases of asthenopia which did not respond to ordinary methods of diagnosis and treatment, prolonged monocular occlusion revealed an important amount of hyperphoria even when the first test had given a record of vertical orthophoria. Occasionally, prisms prescribed after occlusion tests had to be removed later. Illustrative cases are reported. From the department of ophthalmology, Creighton Medical College. Read before the Omaha-Council Bluffs Ophthalmological and Otolaryngological Society, April 23, 1930.

Although the average ophthalmologist devotes the greater part of his working day to the study of refraction cases, he is ever confronted with problems relating to muscle balance. Some of these problems are due undoubtedly to latent heterophoria, as Marlow[1] showed in his monograph on monocular occlusion, published in 1924. A detailed discussion of even latent heterophoria is too huge an undertaking, and therefore only a few of the interesting aspects of the subject have been selected for presentation at this time.

Since 1924 the writer has employed various modifications of the prolonged occlusion test in particular cases. At the beginning, occlusions of short duration were tried, but after some brief experience with this method it was found to be both inadequate and unreliable. In all of the cases of this series, amounting to well over one hundred, occlusion has been employed for not less than forty-eight hours. In some instances it has been prolonged for four days, and in a few cases for as many as five days.

A dry sterile eye pad is made to serve for the cover, and sufficient adhesive plaster is used to exclude all light. The patient is instructed fully in regard to the test and is requested to apply more adhesive should the original tapes become loosened. We emphasize the importance of complete occlusion by impressing the patient with the idea that no light should be allowed to filter through or around the edges of the dressing. This method of occlusion was originally used by others, notably by O'Brien[2] and Clark,[3] and is a marked advance over Marlow's technique. If any great degree of ocular discomfort should arise due to the prolonged covering of the eye, the patient is instructed to report at the office. Here, even while the bandage is being removed, the eyes are kept closed except during the examination of the eye and the instillation of sterile liquid albolene. The eye is then bandaged again. In only one case did the test have to be discontinued temporarily, and then because the patient was found to be suffering from an episcleritis.

In removing the bandage just before the test, and in the test itself, it is important to follow some definite routine plan in the examination. In the writer's experience the following technique has proved satisfactory. (1) With both eyes closed, the adhesive is loosened with benzine. (2) The correction for the ametropia is placed in a trial frame before the eyes, the lenses being centered as accurately as possible without having the patient open his eyes. (3) A Maddox rod is placed before the eye of stronger vision, or, if visual acuity is approximately equal, before the left eye by rule of thumb. (4) By means of a card, the eyes are then alternately screened, while the uncovered eye looks at the test light at six meters. The vertical balance is observed first, and, when the imbalance has been measured by prisms, the vertical balance for thirty-three centimeters is studied in like manner. (5) Then, likewise, the horizontal muscle balance is measured for distance and near. (6) Finally, a red glass placed before either eye will sometimes reveal diplopia that is not overcome for as long as thirty minutes. However, a repetition of the studies of

the muscle balance will begin to show variations after a short interval. In the event of small errors, the imbalance can not be detected in some instances even after five minutes.

Duane[4] suggested that, if monocular occlusion tests were made on patients without any symptoms of asthenopia, phorias could be demonstrated. Fink[5] showed this to be correct. This does not disprove the value of the examination, but shows that true orthophoria is indeed a rare finding. In maintaining binocular single vision, the extraocular muscles adjust the visual axes through the stimulation of the fusion impulse. In orthophoria this adjustment comes about with a minimum of effort. Obviously a greater muscular effort is required for the adjustment in heterophoria. The type of heterophoria, the occupation, and the temperament of the individual patient determine quite largely whether or not asthenopia will be produced.

Jackson[6] has said that nearly all cases of vertical deviation have a paretic foundation. Marlow is inclined to regard most muscular imbalances as congenital. According to his reasoning, the development of subjective symptoms after maturity depends, not upon a beginning muscle deficiency, but upon a lack of adaptation to a previously existing condition. Regardless of the exact etiology of heterophoria, the subjective symptoms result from compensatory adjustment. The muscle or muscles involved in this adjustment suffer from spasm or cramp due to excessive and continuous contraction. That the compensatory response may be too great is illustrated in case number one, in which the postocclusion test revealed left hyperphoria, whereas the preceding studies had indicated right hyperphoria.

There is general agreement that prolonged monocular occlusion is not to be used as a routine procedure. It may be recommended in such instances as the following: (1) Patients who are not relieved of asthenopic symptoms when provided with lenses that correct their ametropia. (2) Persons without demonstrable ocular pathology who are exceptionally sensitive to light. (3) Dissociation in the muscle balance between the findings at six meters and at thirty-three cm.; e.g. right hyperphoria for the one, and left hyperphoria for the other. (4) Individuals who state that they can not read for more than thirty minutes at one time. (5) Any so called neurasthenic patient with asthenopia. (6) Patients who have "panoramic" headaches, vertigo, and nausea which come on while riding on moving vehicles or while watching the cinema. (7) Persons who are wearing prisms that suit their needs according to manifest tests, but who still complain of asthenopia, as discussed by Beach.[7] (8) Individuals who have quivering or twitching of the lids from intermittent spasm of fibers of the orbicularis oculi.

As Clark has shown, it is quite astonishing on the whole to find so many cases with exophoria. The amount of imbalance in a large number of instances would seem to preclude the maintenance of binocular single vision. In the major portion of the cases in this study it appeared, however, that small deviations in the vertical balance caused greater symptoms than even large degrees of horizontal deviation. This is shown in some of the few cases that are detailed in this paper. Correction of the vertical imbalance, ignoring the horizontal, has given relief at times.

In none of the cases included in this report was operation performed, although it was recommended on several occasions where it appeared to represent the more rational type of treatment. For the most part, patients agreed to wear prisms in their correcting lenses, and to practice muscle exercises. The latter form of treatment was adopted in many cases, but, while it is perhaps of occasional benefit in reestablishing a proper relationship between the fusion impulse and the reflex muscular response, its effects are not permanent.

The following cases are presented to

illustrate some of the points that have been commented upon.

Case 1. A clergyman, aged thirty-two years, has worn glasses constantly for eighteen years. He has burning and stinging of eyes, misty vision at both close range and distance, and frontal headache two or three times a week. He becomes dizzy very frequently, vomits occasionally, and is almost always nauseated. He has marked nervousness on doing routine work, and has never been able to use his eyes without symptoms. Muscle balance, at 6 meters: one degree right hyperphoria, one-half degree of exophoria; at 33 cm.: one degree right hyperphoria, and orthophoria. Static refraction after homatropine: small error of compound hyperopic astigmatism of the right eye and mixed astigmatism of the left. After postcycloplegic tests, correcting lenses were ordered with one-third degree prism base down in the right lens and one-third degree prism base up in the left. He returned six weeks later stating that he felt very uncomfortable, even miserable. Examination of the refraction under cycloplegia gave the same results. One degree of right hyperphoria was still present for distance and for 33 cm. Prisms were removed from the correction. One year later the patient was still suffering from the symptoms of asthenopia.

Three years later the patient returned stating that he was almost ready to resign his profession as he could not stand the discomfort caused by close work. At six meters his muscle balance after occlusion for ninety-six hours was: one degree of left hyperphoria, six degrees exophoria; at 33 cm.: one degree left hyperphoria, fifteen degrees of exophoria. Correction was made to include a two degree prism base in in the right lens, and two-thirds of a degree prism base down in the left lens. For two and one-half years now the patient has been comfortable. The patient reported that a brother, an attorney with a splendid practice, had been compelled to give up his profession on account of uncorrectable symptoms of eyestrain.

Case 2. Female, aged forty-eight years, with no occupation due to physical incapacity. Complains of poor vision, aching of her left eyeball, and nausea; has lost a good deal of weight during the past year; has a tuberculous knee; and has never worn glasses.

Postcycloplegic tests: O.D. plus O.50 cyl. ax. 15=6/6; O.S. plus 0.25 cyl. ax. 180=6/6; add plus 1.50 sph. Muscle balance at six meters: one to three degrees left hyperphoria, eight degrees exophoria; at 33 cm.: two to four degrees left hyperphoria, twenty degrees exophoria. Correction given with one degree prism base in in right lens, and one degree prism base down in the left. Later, muscle exercises were given and ocular discomfort was relieved. The patient returned after fifteen months stating that she had been taking treatments from her physician for nausea which had never entirely left her. She observed recently that close work made her nervous and more nauseated. After occlusion for fifty hours we found, at 6 meters: 3.5 degrees left hyperphoria, seven degrees exophoria; at 33 cm.: four degrees left hyperphoria, twenty-six degrees exophoria. Left lens changed to include two degree prism base down. The following week the patient telephoned to give the information that she was no longer nauseated.

Case 3. A farmer, aged twenty-eight years, has frontal headache that comes on at intervals and lasts for two or three days without remission. Eyelids quiver at times and the eyes are sensitive to bright light.

He has very small error of compound hyperopic astigmatism with the rule in each eye under cycloplegia. At 6 meters: 1.5 degrees right hyperphoria, 2.5 degrees exophoria; at 33 cm.: 2.5 degrees right hyperphoria, fourteen degrees exophoria. After occlusion for forty-eight hours the muscle balance at six meters was two degrees right hyperphoria, 3.5 degrees exophoria; at 33 cm.: one degree right hyperphoria, thirteen degrees exophoria. One de-

gree prism base down in right lens, and one degree prism base in in left lens was incorporated in the correction. After two years, prism in right lens was changed to 1.5 degrees base down. Since then he has had relative comfort in using his eyes.

Case 4. Male, book-keeper, aged sixty-six years. Frequent lumps in eyelids, watering of eyes, sensitiveness to light, tendency to redness and itching of eyes after close work.

Examination shows compound hyperopic astigmatism against the rule with a rather marked change from former correction. At six meters: one-half degree esophoria, orthophoria in vertical; at 33 cm.: 15 degrees exophoria, orthophoria in vertical. Correction prescribed at end of third examination: O.D. plus 1.00 sph. plus 1.50 cyl. ax. 180°; O.S. plus 1.25 sph. plus 1.50 cyl. ax. 165°; add plus 2.50 sph. No improvement even when hot compresses, lid massage and zinc sulphate collyrium were employed. Patient returned after fifteen months stating that he had consulted another oculist who had changed his glasses, but without giving him any comfort. After occlusion for forty-eight hours we found, at six meters: two and one-half degrees right hyperphoria. three degrees esophoria; at 33 cm.: two degrees right hyperphoria, three degrees exophoria. Right lens changed to include one and one-half degree prism base down. He had had relief for at least six months when last heard from.

Comment

In a few instances where manifest tests exhibited vertical orthophoria, postocclusion tests revealed as much as six degrees of hyperphoria. Many of these cases are undoubtedly dependent upon a paretic basis in the elevators and depressors. Advancement or tucking operations performed upon the weaker, underacting muscle would seem to be the logical procedure. When prisms are prescribed after prolonged occlusion tests, the glasses should be supplied as soon as possible,—that is, before the former habit adjustment of the muscle balance asserts itself fully. In many cases failure of the test is due to the occlusion period being too brief.

The writer is constrained to state that on several occasions prisms that were prescribed after occlusion tests had to be removed later. This result was generally attributed to the brevity of the occlusion and also to spasm of muscles not directly affected by the prisms. In other words, where prisms are prescribed for vertical deviations, the horizontal imbalance may become more productive of symptoms.

Conclusions

Prolonged monocular occlusion is a valuable measure when evaluated in its true perspective. It is not meant to replace other measures in the routine examination. Its use is called for in the unusual cases of asthenopia which do not respond to the accepted treatment.

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THE LIGHT SENSE AS TESTED BY THE PHOTOMETRIC GLASSES OF TSCHERNING*

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The author recommends Tscherning's glasses as an efficient and reliable means of detecting variations in the light minimum, and for the detection of defects which would be an economic handicap in industry; but finds them of no value in the detection of early signs of glaucoma. Variations from day to day are slight. Pre-exposure is of no importance. Marked reduction in the light minimum was noted in retinitis pigmentosa and retinitis punctata albescens. Only slight changes in the light minimum were noted in optic atrophy, retrobulbar neuritis, neuroretinitis, and glaucoma.

Through the years, many methods have been advanced for the study of the light sense, but no practical clinical procedure has yet been generally adopted. All the tests proposed have been either of a laboratory variety which required great precision and care, or have been so inaccurate that the results were of little value.

The testing of the light sense appears to be of value from two distinct angles. First, as a means of detecting early signs of ocular disease, it has recently been advanced as one of the earliest diagnostic signs of glaucoma. Second, it is of importance as a method of detecting the suitability of applicants for various trades and occupations. Lookouts, sailors, aviators, trainmen, and the like may have good visual acuity, and yet, because of defective light sense, may be unsuited for their occupation. In testing for ocular disease, we need apparatus of delicate precision and accuracy; it is also essential to have absolute control of certain physical factors. For testing employees, grosser methods are applicable, and absolute control of physical factors is not so important.

For the physiology of the light sense, the reader is referred to the works of Parsons and of Edridge Green. For our purpose, it is sufficient to recall that there is a gradual increase in the sensitivity of the retina with reduction in illumination, so that a process of dark adaptation is established. For practical purposes it is stated that an eye is dark adapted after a period of a half-hour spent in darkness. Further, one must differentiate between the light minimum, i.e. the smallest perceptible division of light, and the light difference, or the smallest difference in intensity between two lights. Our work with the Tscherning glasses deals entirely with an investigation of the light minimum.

The photometric glasses of Tscherning

The photometric glasses were devised by Tscherning of the University of Copenhagen and introduced by him in 1922. They consist of a series of glasses each made of two pieces, circular in outline, 33 mm. in diameter, with a gelatin plate between. This gelatin plate is tinted with anilin coloring material, and, by increasing the intensity of the dye, glasses of varying strength are made. The gelatin plate is held between the two sections by means of Canada balsam. The glasses are so made that they absorb, as nearly as possible, all rays of the spectrum to an equal degree, and are of varying strength, numbered by the originator from one to ten; number one of the series transmitting 1/10 of the light striking the glasses, number two transmitting 1/100 of the light and so on to number ten which transmits but 1/10,000,000,000 of the light. Thus number x transmits 1/10 x of the light. Tscherning devised a unit which he calls the photopter (Ph.), and the glasses are so numbered that a glass of n Ph. transmits 1/10 n of the light.

The glasses are so made that they can be combined, as is done with lenses

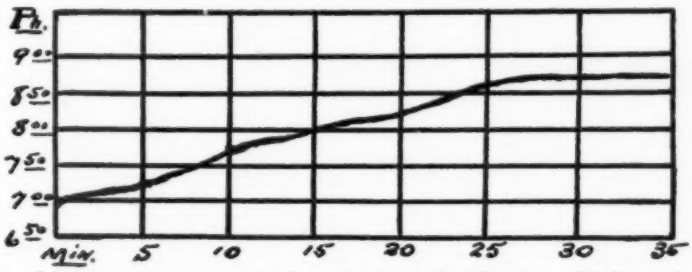
* Abridged from thesis submitted to the faculty of ophthalmology at the Graduate School of Medicine of the University of Pennsylvania, in partial fulfilment of the requirements for the degree of master of medical science for graduate work in ophthalmology. From the department of physiological optics of Wills Hospital in Philadelphia.

in the dioptric system. Thus the Ph. 1.00 and Ph. 2.00 glasses, when combined, give the same transmission of light as does the Ph. 3.00 glass. However, due to the thickness of the glass and the variations which are apt to occur in the intensity of the dye, slight variations will be noted in such combinations. In addition to the whole numbers, there are also certain decimal parts thereof, such as Ph. 0.25, 0.50, and 0.75. The glasses come neatly encased in a box, and included with them is a frame made of wood and covered with black cloth; the glasses fit snugly into this frame and are light-proof before the eye. In addition to the neutral gray glasses, the apparatus has a series of colored ones. The purpose of these is to test adaptation for colors similarly to adaptation for light. The colored glasses add the necessary tint, while the neutral gray ones are used, as in the light sense test, as a means of reducing intensity. We made no attempt to investigate adaptation for colors.

In our work, much time was lost attempting to use the frame according to Tscherning's instructions. Because of the variations in physiognomy, the frame would not fit light-proof before the eye; and if even the smallest ray of light penetrated the frame, the value of the test was lost. In an attempt to make the frame easily adaptable to the face, numerous substances were tried as mountings, such as rubber, sponge, and a ring mask padded with cotton. Finally it was found most practical to secure the wooden holders in a large piece of dark cloth which would cover the whole of the face and eliminate the necessity of plugging small leaks in the apparatus.

Tscherning and his followers, working with these glasses, stated that a person is dark adapted after having worn the Ph. 10.00 light-proof glass before the eye for a half-hour. At the end of this time, one should be just able to distinguish through a Ph. 10.00 the flame of a "standard stearine candle" placed 50 cm. in front of the eye.

Tscherning intended using the glasses to measure the range of adaptation in a manner similar to the method used in measuring the range of accommodation. A maximally adapted eye should see the candle flame at 50 cm. through Ph. 9.00 to Ph. 10.00; hence the range of adaptation would be from 0 to 10. To obtain this high figure it is necessary to fix eccentrically so as to avoid the central darkness scotoma. For the fovea, Tscherning obtained a Ph. value of 7.00, due to the much poorer dark adaptation of this area of the fundus. He believes this lower value at the macula is due to absorption of light by the yellow pigment at this spot.



Light sense as tested by photometric glasses. (Delaney.) Graph showing rate of adaptation in fifteen cases.

Tscherning's later suggestion has been to use the glasses to determine the degree of brightness of an object. For this standard, he finds that a maximally adapted eye (one which has worn a Ph. 10.00 light-proof glass before the eye for a half-hour) is just able to see a piece of white paper, 27.5 mm. square, placed at a distance of one meter, through a Ph. 5.00 glass when illuminated by a standard candle. The degree of brightness of this paper he puts at

five. That of the flame of the standard candle he puts at ten, because one is just able to see the flame through the Ph. 10.00 glass when maximally adapted. He defines his unit of brightness as "the faintest light which a maximally adapted eye is able to perceive".

Most of the work reported with the Tscherning glasses deals with the investigation and determination of the brightness of objects and the testing of visual acuity under reduced illumination.

The problem which we have attempted to solve is the practicability of the Tscherning glasses as an office procedure for the testing of the light minimum. We have attempted to ascertain whether these glasses will disclose alterations in the light sense, thereby enabling the ophthalmologist to utilize them in the diagnosis of disease and altered function of the eye.

In an attempt at standardizing variable factors, our first aim was directed against the "standard stearine candle" mentioned by Tscherning. To this end, inquiry was made at the Bureau of Standards in Washington as to what constituted a "standard candle". The report was: "Standard candles are no longer used in photometry, because candle manufacturers found it impossible to make them to comply with the specifications that were set up for their manufacture. Further, the Bureau does not recommend the use of a candle, because no candle can be depended upon to give a constant light output. . . .".

However, since Tscherning specified merely "a standard stearine candle", we adopted a stearine candle of 20 mm. diameter with a 1.7 mm. wick. More recently, Møller has given the dimensions of the candle which he is now using. These were expressed in terms of the size of the flame.*

In an investigation of the rate of adaptation, we used as a constant source of pre-exposure, ten minutes under the standard seven-foot candle-power illumination of the perimeter, with the patient gazing at the gray background of the tangent screen. This was arbitrarily adopted because of its ease of accurate reproduction at any time. No attempt was made to study the rate of adaptation with variation in pre-exposure as that had already been accomplished by others.

Ten minutes having elapsed, the mask was applied over the face of the individual, and notations were made as to the strongest Ph. glass with which the candle flame could be seen. The rate of adaptation was tested in a series of fifteen cases. The result is shown graphically below.

Having tested the rate of adaptation in these fifteen cases, it was apparent that the method was not a practical one for office work, because it necessitated the constant attention of the ophthalmologist through the whole period of the test, namely, about forty minutes as a minimum. Further, changes had to be made in jumps, and the procedure was quite difficult to carry out.

Our next problem, having decided that rate testing would not prove practicable, was to find what constituted the normal light minimum. To do this necessitated the determination of the effects of certain variable factors which Derby and his workers had controlled in their investigations. Hence, we investigated the effects of pre-exposure, the variations found in the same individual when tested from day to day, and the effect of the size of the pupils.

Effect of pre-exposure: Edmund and Møller followed the course of dark adaptation with these glasses after various conditions of pre-exposure such as to direct sunlight, ordinary daylight, twilight, etc., and while they found a marked difference in the rate of adaptation, dependent on the type of pre-exposure, their plotted diagrams showed that at the end of a half-hour, all had reached the same degree of dark adaptation. Hence, we assumed that pre-exposure played no part in the light-minimum results as tested at the end of a half-hour period. To prove this factor,

* Møller uses a candle which gives a flame approximately 4.5 cm. high and 0.7 cm. in width. Our candles give a flame 3 cm. high and 0.6 cm. in width; variations are dependent on many factors.

three cases were retested on varying days with a pre-exposure to daylight, to ordinary room light, and then under the measured light of the perimeter (seven-foot candle-power). The subjects were left exposed in these places for ten minutes, after which the process of dark adaptation was begun. The results obtained at the end of a half-hour for the same individual varied no more than the results from the normal individual varied when he was tested from day to day. Hence it was decided that for a practical use of the glasses as a test for the light minimum it was unnecessary to consider pre-exposure.

Variations of the same individual when tested from day to day: To carry out this observation, five normal cases were selected whose eyes were constantly under the effect of a mydriatic, with the result that the pupillary size was always constant. Each of these cases were tested on three successive days, and the results compared. The variation was in no case greater than one-half photopter, although there was usually some variation from day to day.

Effect of the size of the pupil: Five normal cases were tested on three successive days. On the first day the pupil reacted normally to light, on the second day the pupil was constricted to pinpoint with eserin, and on the third day it was dilated with atropin. The results obtained on these days were not as striking as one might believe, when he considers the difference in the amount of light which enters the pupil. The variation from the eserinized eye to the normal eye was not more than one-half photopter, while the change from the atropinized eye to the normal was likewise not more than one-half photopter. The greatest variation between the eserinized and the atropinized eye was one photopter. In view of the fact that the variation found was little more than that which occurs daily in the same individual, we concluded that for a practical examination, it is merely necessary to bear in mind that the size of the pupil may affect results by approximately one-half photopter either way.

Normals: As a basis of what normal light minimum should be, as tested with the Tscherning glasses, fifty normal cases were examined, and an average was reached as to what constituted a normal Ph. value; in this series, it was found to be between 8.50 and 8.75. This is somewhat lower than the results obtained by Tscherning and his workers, who state that at the end of a half-hour the normal person should see the flame of the candle through a Ph. glass of 9.00 to 10.00. In this series, it was found that only four of the cases tested were able to get a Ph. value of 10.00, and it is significant that all four of these subjects were ophthalmologists who knew precisely what to expect. However, none of the normal cases fell below Ph. 8.00.

In working with this apparatus, one must fully appreciate the great difficulty which the patient often has in exactly locating the light. Due to the central darkness scotoma, the Ph. value at the macula as given by Tscherning is only 7.00; hence, if one is to see the light through the higher number glasses, it is necessary to use areas of the retina outside the fovea. Through custom, however, the eye rotates to bring the fovea into the direct line, and as a result the light is lost in this rod-free area. In a patient of meager intelligence, this factor is one of great annoyance and is a distinct hindrance to obtaining satisfactory results.

Another factor of minor importance, and yet one which must at all times be guarded against, is the phenomenon which one sees exemplified in the blind, i.e., the belief that they can still see. So it is with the patient who has been left in the dark for a period of a half-hour with the mask before his face. He is told to hunt for the light, and frequently the imagination seems to be more active than the retina, because he will find the light when it is not present. This was found to be true in patients of even more than average intelligence.

While original writers state that the method is applicable even to very young children, the restlessness caused by prolonged darkness makes the child rather uncooperative and apt to see

many more candles than are existent.

Having determined what constituted a normal light minimum as tested with these glasses, and the effect of variable factors upon the results, our next problem was an investigation of the light minimum in disease. We conducted experiments upon cases of glaucoma, so called pre-glaucomatous eyes, tapetoretinal degeneration, retrobulbar neuritis, optic neuritis, and optic atrophy. In all pathological cases, visual field studies were made as a basis of comparison with the light-minimum findings.

Glaucoma: The results obtained in a study of twenty-six cases of glaucoma showed that the light-minimum values were very dependent on the stage of the disease. The average Ph. value for this series of cases was 6.00, but the values varied from Ph. 2.00 in an eye which had only an eight-degree field around fixation, with vision reduced to fingers (the other eye normal with a Ph. value of 9.00), to a case with a Ph. value of 7.75 (vision of 6/9) and a field which showed only a very early nasal contraction and a slightly enlarged blind spot.

It was found that reduction in visual acuity and lowering of the light minimum were more related than were reductions in the field of vision and the light minimum.

The effects of tension in its relation to light minimum were also followed, but because of lack of constancy, no conclusions could be drawn from this series. From the above study, we are forced to conclude that light-sense testing with these glasses in cases of glaucoma is of less value than the information which can be obtained by a test of visual acuity and a perimetric examination.

Early glaucoma; preglaucoma: Here were classified nine cases which showed only the very earliest evidences of glaucoma: e.g. glaucoma in the one eye, with the fellow eye showing suspicious cupping or a shallow anterior chamber. The results of the examination of this small series of cases indicated that there was no change in the light minimum that could be detected by means of these photometric glasses. All the cases gave light-minimum values which fell well within the normal range as found by us. To say that some cases were on the low edge of our normal would not be satisfactory evidence of a sign of glaucoma. The Ph. values, however, averaged 8.25, which is lower than our normal group; still all cases were over the Ph. 8.00, which we have come to regard as the dead line for normality.

Møller, working in the Tscherning laboratories, also reached the conclusion that in early glaucoma there is no change in the light minimum, as tested by these glasses.

Tapetoretinal degeneration group (retinitis pigmentosa and retinitis punctata albescens): Four cases of retinitis pigmentosa were tested and in this disease the glasses did give excellent results. The Ph. values obtained average between 4.75 and 5.00. One case of retinitis punctata albescens was examined and the result was uniformly good in each eye; Ph. value, 5.50. The patient was a very cooperative one and the result here was most accurate.

It is in these types of cases that truly good results can be obtained by the use of these glasses. It is this type of case also where the testing of the light sense with these glasses becomes of practical importance in ascertaining the fitness of applicants for certain occupations, such as aviation, where an accurate light sense is important.

Retrobulbar neuritis (toxic amblyopia): Eight cases were tested with an average result of Ph. 7.75. None of the cases tested exceeded Ph. 8.00, nor did any of them fall below Ph. 7.00. Careful fields were taken in all cases and most of them showed the form field to be full or only slightly contracted. All showed a central or a paracentral scotoma. The conclusion reached was that the light minimum was little affected by this disease of the conducting mechanism—a conclusion in harmony with other workers in the past.

Optic neuritis: Eight cases of neuroretinitis were tested. The average result was 7.50. Here again all cases

tested varied between Ph. 7.00 and Ph. 8.00, but the fields were all much more involved than in the above cases, showing sector-like defects or concentric contraction. The conclusion was that the light minimum was slightly affected in this disease.

Optic atrophy: Nine cases of optic atrophy were studied and the average Ph. value was found as 7.25. Cases varied between Ph. 6.50 and 7.50. The fields in none of these nine cases exceeded fifteen degrees around fixation. These findings bear out the results of other investigators in the past who found that the light minimum was very little affected in optic atrophy.

Conclusions

(1) For a practical test of the light minimum by the ophthalmologist, and for the detection of defects which would be an economic handicap in industry, Tscherning's glasses are an efficient and reliable means of detecting variations.

(2) Variations will be met in values obtained from the same individual when tested from day to day. These variations are slight, covering about the same range in value as the variations caused by differences in the size of the pupils.

(3) Pre-exposure is not of importance, since, at the end of a half-hour, the patient will have reached the same state of dark adaptation regardless of the pre-exposure.

(4) Marked reduction in the light minimum is noted in retinitis pigmentosa and retinitis punctata albescens.

(5) Slight changes are noted in the light minimum in such disorders as optic atrophy, retrobulbar neuritis, and neuroretinitis.

(6) Tscherning's glasses will detect changes in the light minimum in more advanced cases of glaucoma, but these findings are of less value than a good perimetric examination and visual acuity test.

(7) Tscherning's glasses are of no value as an early aid in the diagnosis of glaucoma before other signs are present in the eye.

138 West Ninth street.

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CONGENITAL TOTAL COLOR BLINDNESS

Case report

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This is the eighth case reported in this country, the total number in the literature being about one hundred and twenty-five. Photophobia or dazzling is frequently the chief complaint. In the present case the main difficulty was day blindness without pain or ocular discomfort. From the department of ophthalmology of the University of Pennsylvania.

Congenital total color blindness is a moderately rare condition. In 1926, Julia Bell[1] published a bibliography of this condition in which she included one hundred and nineteen cases; all the recorded cases to that date. The earliest of her cases had been recorded by Huddart[2] in 1777. Up to the time of Bell's work there had been but one report from this country, which had been made by Colburn[3] in 1897. In a paper on congenital nystagmus, Colburn had given a short account of two cases, in a girl of fourteen years and a boy of twelve years, each of whom was totally color blind and had had nystagmus since shortly after birth. Since the report by Bell, I have been able to find records of but eleven additional cases. Five of these cases were from this country; one each was by Bonner[4] and Bennett,[5] and three were by Beach.[6] This makes a total of but four reports, including seven cases, of this condition from this country.

Two of the cases listed by Bell, namely those by Becker[7] and by Piper,[8] were unilateral in character. Since then the only additional report of a unilateral case is the one by Bonner.

There has been but one microscopic report of an eye with congenital total color blindness. This was made by Larsen[9] in 1921. He was able to demonstrate that cones were present in the normal number and distribution, but states that the cones of the fovea were shorter and broader than normal. There was no clinical history with the report of this case.

These cases are unusually uniform in the characteristics which they present. Bell lists the following six cardinal points: (1) amblyopia, (2) photophobia, (3) nystagmus, (4) shortening of the red end of the spectrum, (5) displacement of the brightest part of the spectrum from the yellow towards the green, and (6) frequently a central scotoma. The amblyopia is not dependent upon errors of refraction, and in five of the cases reported by Bell there was total color blindness associated with good central vision. Photophobia, or rather dazzling, as Beach describes it, is the symptom which is frequently the chief complaint. In the present case the chief complaint was day blindness. There was no pain or ocular discomfort associated with this, only an inability to see under high illumination. Both nystagmus and a central scotoma are frequent, but are not necessarily present.

Case report: Miss C. T., aged twenty-three years, was first seen in Dr. Holloway's office on August 28, 1929. She was later studied at the University hospital. She came for examination because of day blindness. She stated that on a bright day her vision was so poor that she was unable to go about alone, but that in dim light she was able to get about very well. When she came from a brightly lighted room into a dimly lighted one her vision immediately became better. There was apparently no necessity for dark adaptation. Continued bright lights after a time made her eyes feel strained. She was totally color blind. To her, different colors had a different amount of brightness, but she was unable to name colors from their different luminosity. She had always been well, and was the fifth of eight siblings and the only member of her family with any ocular deficiency.

Her vision in the right eye with a plus one cylinder axis 105° was 6/60, and in the left eye with a plus one cylinder axis 60° was 6/30. This was with no direct illumination on the test card. Extraocularly her eyes were

negative and there was no gross nystagmus, although a short lateral nystagmoid movement could be detected by ophthalmoscopic examination. Intraocularly the media were clear, the discs were healthy in outline and color, and there were no lesions of the vessels, macula, choroid or retina. Her vision was not improved by refraction. The general examination was entirely negative except for the presence of diseased tonsils, and these were removed by Dr. Campbell. The visual fields for one and two degree white test objects, and the blind spot for the one degree white test object were normal in size and outline. The Jennings test could not be done with any accuracy and she was unable to make out any of the figures on the Edridge-Green color plates.

The luminosity curve of this patient and also that of a person with normal vision, in this instance Dr. Wentworth, was determined. Both were light adapted during this determination. This was done by projecting the spectrum upon the object plate of the Macbeth illuminometer. The illuminometer itself was mounted upon a stand and focused upon the portion of the spectrum the luminosity of which it was desired to determine. The readings were made in millilamberts. The curve was plotted upon a chart. It shows the point of maximum luminosity in the color blind person to be displaced toward the green, and shows the red end of the spectrum to be shortened. This corresponds closely to the achromatic scotopic luminosity curve with normal color vision.

The explanation of congenital total color blindness depends upon the theory of color vision adopted. According to the duplicity theory, elaborated by Kries, the achromatic scotopic vision is carried out by means of the rods, and the photopic vision by means of the cones. The facts of this theory had been previously stated by Schultze and Parinaud. By this theory, therefore, total color blindness would be due to the lack of functioning of the cones. This also explains the poor central vision that is usually seen, but is inconsistent with the findings in the cases that have been reported with good central vision, and does not agree with the histological findings of Larsen, that the cones are present in the retina in normal number and distribution. In this regard, Parsons[10] states that "we may conclude that the foveal epithelium, if it retains its function at all, approximates in character to that of the normal rods".

The Young-Helmholtz theory is based upon color mixtures in the normal eye, and according to this theory there are three color components. For these components Young chose a red, a green and a violet. Color blindness is explained as the absence of one or more of these components, and total color blindness by the identity of all three components. This theory does not explain total color blindness so well as the duplicity theory does.

The Hering theory states that there are six primary color sensations, arranged in three pairs, and that the members of each pair are antagonistic to each other and are dependent upon antagonistic physiological processes. These color sensation pairs are white-black, red-green, and yellow-blue, and for each of these there is a hypothetical visual substance. Total color blindness is explained, therefore, by the supposition that only the white-black substance responds to all light stimuli.

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THE GUIST SPECULUM

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The speculum originally described by its inventor, Gustav Guist of Vienna (Zeitschrift für Augenheilkunde, March, 1930) is described and illustrated, and is strongly recommended for use in cataract extraction, with a slight modification advised by the author of this paper. The special function of the speculum is to afford steady fixation of the eyeball, at the same time raising the lids from the eyeball so as to avoid danger from squeezing.

While attending the clinic in Vienna last summer, in company with Dr. E. C. Ellett of Memphis, I saw Guist using a lid speculum of special device, and found upon inquiry that it was made for him by Reiner of Vienna. Dr. Ellett and I were so impressed with the value of this instrument that we brought several home with us.

I have been using this speculum constantly since my return, and am so strongly impressed with its value that I feel I should lay it before the readers of the American Journal of Ophthalmology.

The following drawing, which Mueller and Company have been kind enough to have made for me, shows the instrument perfectly.

The next illustration is a photograph of the speculum in place on a patient being operated upon by Dr. Wm. M. Bane of Denver.

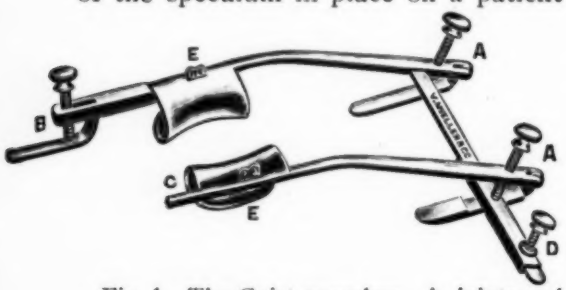

Fig. 1. The Guist speculum. A, joints and thumb screws depressing the temporal levers which elevate the temporal portion of the speculum. B, thumb screw and lever which rests on the bridge of the nose. When the thumb screw depresses the lever the nasal side of the speculum is elevated. Thus the functioning of all levers causes elevation of the blades of the speculum, and the lids are held away from the eyeball. B and C, the lever attached at B when speculum is to be used in left eye; removed and attached at C when to be used in right eye. D, thumb screw clamping the sleeve slide which permits opening and closing the blades of the speculum. E, two small rings on each blade through which the superior rectus suture is tied.

When the speculum is to be used the removable lever sleeve is slipped over the post on the blade which goes under the upper lid.

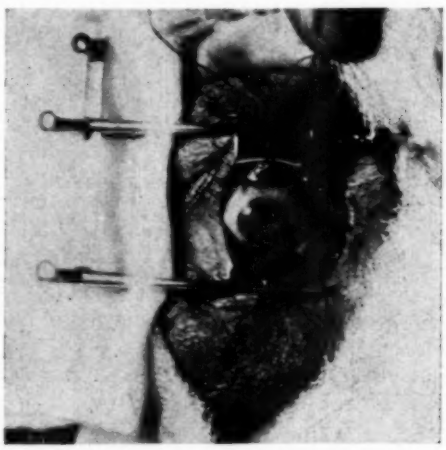

Fig. 2. The Guist speculum in use.

The suture that Guist uses is passed through the conjunctiva and the superior rectus as far above the cornea as possible. It is then brought out between the blades of the speculum and passed through a hole in the upper edge of the upper blade and tied. This turns the eye downward and fixes it so that the patient is unable to make any movement of the eye whatever. The eyelids are held entirely away from the globe, and with the eye turned down in this manner it is plainly to be seen that the likelihood of the patient doing harm is reduced to a minimum. The need of fixation is optional.

Guist fixes or not in accordance with the suture fixation. At most, about all that is needed is to place the forceps against the sclera on the nasal side of the cornea, to steady the globe dur-

ing the puncture and counterpuncture.

My small contribution to this speculum is two small rings marked E on the illustration. Guist's hole in the blade for the suture is in the middle of the upper edge of the blade, and not infrequently the suture is not guided far enough temporally, with the result that the eyeball is turned too far nasally. When the counterpuncture is made it is hard to keep the point of the knife out of the caruncle. The metal loops are easier to pass the needle through than the holes in the blades, and the selection of the more temporal loop is desirable in most eyes because it holds the eye in a median position or turned slightly outward.

It is my practice to use O'Brien's akinesis, thus further insuring lid relaxation. I also place a suture in the upper lid to facilitate handling of the lid during removal of the speculum. After removal of the speculum, this lid suture can be fastened to the cheek with a small piece of adhesive, thus insuring the lid against slipping open after the dressings are in place and the patient has been sent to his room. This opening of the lid is something that may happen after akinesis, so why not guard against it, when the lid suture is a most convenient thing at several steps of a cataract operation?

If others find that the Guist speculum simplifies cataract extraction as much for them as it has for me, I shall feel amply repaid for having called it to their attention.

I desire to thank V. Mueller and Company of Chicago for their help in bringing this instrument to the ophthalmologists of this country, as well as for executing the slight modification I have devised.

424 Metropolitan building.

PERSONAL EXPERIENCE IN THE MANAGEMENT OF CATARACT

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Personal preferences as to management of the cataract patient before, during, and after operation are stated on the basis of twenty-five years experience. Read before the Kansas City Society of Ophthalmology and Otolaryngology, March 20, 1930.

In twenty-five years' practice of ophthalmology it should be possible to acquire rather definite views as to how routine cases are to be handled. This paper gives my opinions and procedures in the management of cataracts.

Shall we operate on a cataract in one eye when the other one is normal? My answer to that is "Yes, providing the cataract is ripe". And I know many oculists who say, "no". In the first place, a one-eyed man is at a great disadvantage in these days of heavy traffic. It is dangerous enough to get about today with two eyes, but even more dangerous with one. Removal of the lens at least gives a field of vision on the formerly blind side. The period of ripeness is the most favorable time for operation, and a certain number of these eyes if left unoperated eventually develop glaucoma.

Every case of cataract should be given the privilege of an examination with the slit-lamp, and it is surprising in how many unilateral cataract cases one will find a low grade uveitis, as evidenced by fine precipitates, cells in the aqueous, and not so rarely the so-called Koeppe nodules on the iris border. Should these cases be operated? The answer is that they stand operation well. Some three years ago I wrote briefly on the nature of Koeppe nodules. The patient referred to therein was operated on for cataract, he still shows cells in the anterior chamber and many nodules on his iris, but his vision is still 20/20— after three years, and I believe he is good for many years more of useful vision.

Some ophthalmologists regard the confusion of images often seen after removing a cataract where the other eye is normal, as a sufficient reason not to operate. When this disturbance of vision is not quickly overcome by the patient I regard it as the fault of the ophthalmologist in charge. If the patient is told exactly what to expect and how easy it is to suppress the confused image he quickly proceeds to master the situation. One of the best examples to give the patient is that of the medical student who quickly learns to keep both eyes open while using the microscope or ophthalmoscope.

Are cultures and smears desirable before operation? I think most men agree that they are. When we find more than a few colonies of staphylococci or xerosis bacilli we wait and treat the patient as we always do when other organisms are found. Where there is no apparent lacrimation or redness we do not investigate the lacrimal apparatus other than to make pressure over the tear sac. Where the condition of the tear passages is in doubt, we are not satisfied to rely on fluorescein or argyrol running through into the nose or fluid injected into the sac. It is possible to get a fairly quick drainage of fluid through and yet to have strictures which we regard as dangerous. I believe that then the best procedure is to probe once or twice with small probes, never over size 4 Bowman. If that suffices to clear up the condition one may then operate. If not, one should do a dacryocystorhinostomy, or remove the tear sac, wait a while, and then operate the cataract.

It goes without saying that the cataract patient should be medically examined before operation and a fairly clean bill of health given. Painful experience with hemorrhage has led us to adopt the rule on my service that the diastolic pressure should be reduced below one hundred, or at least every attempt made to do so, before operation is allowed. I believe that by doing this many hemorrhages will be prevented. Diabetics can perfectly well be operated on, but the urine should be sugar free,

the blood sugar within normal limits, and they should be under expert medical attention. Every hospital should have apparatus for injecting glucose solution instantly available; you never know when it is going to be needed by the patients who are taking insulin. When such a patient becomes comatose, as will occasionally happen, quick action is needed.

I do not believe it is necessary to clear up foci of infection in cataract cases when they have existed for some time and are not acute, unless there is some special indication for it.

In regard to the preparation of the patient for operation, I believe in doing as little as possible. With patients of normal digestive habits I do not use a cathartic. Many of my colleagues use some sort of sedative the night before operation and often again in the morning. I think that the best results are acquired by bringing the patients to operation with the least disturbance to them. Often my patients do not enter the hospital until the morning of operation, unless they live at a distance or the operation is to take place early. Ordinarily I let them choose. No drugs are used. My patients are instructed beforehand that they will have three injections of novocain before the operation and they will feel nothing. They are told that the operator takes full responsibility and none rests on them. We see very few of the so-called bad actors under modern methods of anesthesia; at the most we may have to put a stitch through the superior rectus to hold the eye down, but in our experience that is seldom necessary. Having lived through the period when there were many bad actors and the surgeon was constantly on tenterhooks as to whether some disaster was not going to occur, I wish especially to stress this point. In my experience the advance of the last ten years in the technique of cataract extraction is one of the high lights of ophthalmology.

We clip the lashes, wash the face, and put a sterile pad over the eye, the simplest possible preparation; then on the table we use iodine on the skin, scrub the roots of the lashes a little, and wash out the eye gently with some bland sterile solution. I care nothing whether the patient be operated on in bed or on an operating table so long as he is comfortable and the operator is comfortable. When we operate in bed we raise the bed on blocks to get the most convenient height. In one hospital I use a bed, in another an operating table. Where many cases are being done the same morning, I think the bed is the quicker method as the patients require so little handling.

I am not going to discuss the advantages of the different cataract operations; every man soon learns the methods of his choice with which he gets the best results. In general the method must be fitted to the case.

I think we may regard it as an axiom now that all cases should have their lids injected with novocain. To put the matter as bluntly and brutally as possible, I regard the men who say that they do not need to inject the lids in many of their cases as unfortunately inexperienced in the methods of operating. I still use the original van Lint method of injection, because I find it always works and never does harm, and I have not had as much luck with the modifications. Akinesia is point number one in the improvement of cataract extraction. Point number two is better anesthesia than we had in the old days of simply instilling cocaine. Akinesia and good anesthesia are the best cures for the unruly patient. A patient seldom becomes unruly if he does not feel any pain.

For anesthesia I prefer the orbital injection of novocain plus instillation of cocaine. Personally I cannot get as good anesthesia with subconjunctival cocaine. I use one to two c.c. of novocain injected through a 3.5 cm. needle back of the eye. I enter the needle at the inner canthus through the conjunctiva just above the internal rectus. Anatomically it is better to go in below through the outer portion of the lid, and shoot the region of the ciliary ganglion, but the method I use always works and is convenient; theoretically

it is more apt to weaken the action of the superior rectus, which is an advantage, while the lid method is more apt to hit the inferior rectus, which is a disadvantage. It is easier to get back into the orbit from the inner canthus than from the outer, as the outer wall of the orbit runs back at more of an angle. Among some hundreds of cases injected I have hit a blood vessel six or seven times. In this event it is necessary to tie up the eye and wait for forty-eight hours. No one of these cases suffered damage to the eye and all were successfully operated. I inject my patients the first thing, before the local preparation, so as to give the anesthetic as much time as possible to work.

The third factor in operating that I wish to mention is more controversial, but I believe eventually it is bound to become accepted practice,—that is, the use of a stitch to close the wound. There are a number of good stitches and more bad ones. A good stitch should hold the two lips of the wound firmly together, and this the conjunctival stitch will not do. The stitch must necessarily be put in place before the eye is opened. I still use the stitch which I described five years ago at the Chicago meeting of the American Medical Association. It takes three minutes to insert, and, when inserted, by pulling on the threads the wound can be instantly closed and held tight. Rarely we get a prolapse at the angle of the wound; one stitch will not prevent that, but it is a rare occurrence. With a stitch closing the wound you can operate on chronic asthmatics, people with hay cold, and restless people hard to control after the operation, with perfect confidence. Just because most cases do well without a stitch is no argument against it. Suppose the patient vomits after the operation or coughs violently, or suppose you have to get the patient up. When the wound is clamped down with a stitch the operator may feel secure.

After-treatment: If you wish your patient to be comfortable and to avoid various distressing complications, put him in a mechanical bed with adjustments for raising the head and the knees. Too many patients are allowed to lie flat and hyperextended on their backs for several hours without moving. The result is that they get aching backs and are extremely likely to become distended, get gas pains, and vomit. Many patients have told me, "The eye is perfectly comfortable, but I have the most terrible pain in my back." You do not read anything about abdominal distension in articles on after-care of cataract, but we all know that it is a distressing and not an infrequent complication. The answer is the adjustable bed; if that is not available, use plenty of pillows after operation. I place my patients up at an angle of anything up to forty-five degrees after operation. I let them turn on either side and I do not darken the room.

We usually give one-half grain of codein shortly after operation, and find that it adds distinctly to comfort and seldom produces nausea. They are also given luminal the night after the operation. A certain percentage of patients will be nauseated by morphia; therefore we do not employ it unless the indications are plain. My patients get soft solids on the day of operation and normal diet the next day. If the bowels have not moved by the second night after operation they are given the cathartic they are most used to. If the patient cannot void while in bed he is allowed to get up carefully. Ninety per cent of patients who show signs of post-operative delirium or mania can be controlled by getting them up in a chair immediately and by uncovering one eye.

We keep our patients in bed with both eyes covered for four days, and on the fourth day they get into a chair and only the operated eye is kept covered. On the seventh day the operated eye is uncovered, on the eighth day the stitch is removed, and on the eleventh day they leave the hospital. I do not stress these latter points; there are other methods which no doubt are just as good or better. I have had patients up in a chair and with one eye open dur-

ing the whole postoperative period, and they did perfectly well. A good firm stitch allows the surgeon wide latitude and great assurance.

One of the commonest accidents which occurs during the convalescence from cataract extraction is contusion of the eyeball from one cause or another, usually the patient's own finger. It is a natural thing to put one's hand to the sore spot when in a doze or awakening from sleep. Such accidents are not infrequent with us in the first week after operation and we have not found the answer. No form of dressing we have used, the Ring mask, the aluminum shield or the wire screen will prevent an active patient from getting his finger under and bruising the eye. We use the Ring mask on all our cases, but the accident occasionally occurs. The most frequent result is a hemorrhage in the anterior chamber. Rarely the wound opens at the corner and we get a prolapse. The central part of the wound held by the stitch never opens. Verhoeff ties his patients' hands down with bandages so that they cannot reach the eye. This constraint is, however, productive of a good deal of discomfort and we hesitate to employ it.

One plea I should like to make before closing. I believe that the operated patient should be kept under observation for some months after operation and the tension watched. It has been my misfortune to have seen quite a number of cases of glaucoma following cataract extraction. One patient, a very old and delicate man, I allowed to go to Florida six weeks after the operation, which took place at the beginning of the winter. He noticed a slow failure of vision in the eye but did nothing about it, and when he returned in the spring the eye was blind. It seems to me that these cases are most difficult to handle. I am not referring to acute glaucoma, but rather to the cases where the tension is sufficiently raised so that the eye slowly deteriorates. In some there is a low-grade uveitis with many cells in the anterior chamber; in other cases there is vitreous in the anterior chamber. In some of these, with the use of pilocarpin and an occasional paracentesis, the tension slowly subsides. In others, capsular tags must be divided and often some decompression operation must be performed, which helps for a time and then the tension goes up again. One thing is certain, and that is unless you follow your patient carefully and fight your hardest the eye will surely go blind; it may even happen in spite of all your efforts.

One other thing I should like to refer to before closing. A secondary iris prolapse should be dealt with at the earliest possible moment. It takes a good deal of moral courage, especially in a young man with his reputation to make, to open up again an eye that he has operated on one or two days previously, yet to my mind it is the only thing to do. A knuckle of iris in the wound is apt to keep the eye irritable and will cause a disturbing astigmatism, and when it is allowed to remain you are likely to have many future regrets. If the condition is disposed of quickly you will save yourself much trouble later on.

To recapitulate: Disturb the patient as little as possible before operation. Relieve his mind of responsibility. Resort to lid injections, perfect local anesthesia, and an efficient stitch. Afterward, put the patient into a comfortable posture, provide good nursing, control postoperative pain, and above all use common sense.

5 Bay Street road.

CALCIUM DETERMINATIONS ON CATARACTOUS HUMAN LENSES

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IOWA CITY

The cataractous senile lens is remarkable for its relatively large calcium content, as compared with the normal lens, from which calcium has been recorded by several observers as entirely or almost entirely absent. The author's separate analysis of each of forty-five cataractous human lenses showed an average of 35.4 mg. per 100 gm. No calcium could be demonstrated in five lenses with incipient cataract, and the only black cataract examined also contained none. From the departments of ophthalmology and biochemistry, State University of Iowa.

One of the remarkable features of senile cataract is the accumulation of relatively large amounts of calcium in the lens. Eight determinations made by me on normal lenses of cattle and rabbit eyes (a single lens being used in each determination) revealed no calcium. The same result was obtained by Burge,[1] who examined both animal and human lenses. Bürger and Schlomka[2] demonstrated only a trace of calcium in cattle lenses, using 17 gm. of the fresh material. On the other hand I have unpublished data showing that the humors surrounding the lens contain appreciable amounts of calcium, 7.2 mg. per 100 c.c. for the vitreous, and 5.0 mg. per 100 c.c. for the aqueous. Calcium determinations on cataractous human lenses have been made by several other investigators, but collections of several lenses were always used in each analysis. The calcium figures for cataractous lenses in the present study as given in table 1 and summarized in table 2 are based in each case on the analysis of a single lens.

Method of analysis

In the determinations of calcium, use was made of the Kramer-Tisdall[3] method in which the acid solution of calcium oxalate is titrated with a 0.01 N potassium permanganate solution. The lens was first digested with about 2 c.c. of perchloric acid in a 50 c.c. centrifuge tube on an electric sandbath. After cooling and dilution, and before the addition of ammonium oxalate, the contents were neutralized to methyl red with ammonium hydroxide. On account of the presence of phosphates, the precipitation of calcium as its oxalate was carried out at a hydrogen ion concentration of about 5.5 on the pH scale. In an alkaline or even in a neutral solution in the presence of ammonia, at least a part of the calcium precipitates as the insoluble calcium ammonium phosphate, and thus escapes the formation of calcium oxalate. In the titration, a 2 c.c. microburette graduated in 0.02 c.c. was used.

In all, fifty-one cataractous lenses (forty-four cases) were examined. The analytical data are accompanied by short case histories of the patients.

The figures of table 2 show that there is practically no correlation between the calcium values and the duration of the cataract. The same is true with respect to the calcium values and the ages of the patients.

The distribution of the above cataract cases of known ages according to decades is as follows:

Years	Number of cases
0-60	6
60-70	7
70-80	21
80 and above	6

Discussion

At the present time we do not know whether the large amounts of calcium in cataractous lenses have any etiologic importance or not. It may be that some change in the calcium content of the body has a bearing on cataract formation. Pelláthy and Pelláthy,[4] however, examined the blood of forty-eight patients with cataract, and found the calcium values to be within the normal range of 9.1-11.9 mg. per 100 c.c

Table 1

CALCIUM DETERMINATIONS ON CATARACTOUS HUMAN LENSES.

Series number, sex, age, and history (including duration of cataract)	Wt. of lens in mg.	Calcium	
		Mg. per lens	Mg. per 100 gm.
(1) Case history unknown.	153	0.0666	43.9
(2) F., 58: O. S. 4 yrs., O.D. 6 mos. Diplopia. V.O.S. light and shadow, V.O.D. 6/30+1. Wassermann, cholesterin antigen, 4 plus.	122	0.1144	94.1
(3) M., 54: O.D. 5 yrs., O.S. 18 mos., V.O.D. light and shadow. V.O.S. 3/60. Incip. diabetes yrs. ago. Pyorrh.—extract. of all teeth.	184	0.0352	19.1
(4) M., 82: O.S. blind several yrs., V.O.D. c.f. at 1.5 m.	135	0.0616	45.6
(5) F., 62: O.D. 1 yr., O.S. shortly afterwards. V.O.D. light and shadow. V.O.S. c.f. at 0.5 m.	99	0.0352	35.7
(6) F., 67: O.S. several yrs., O.D. afterwards.—Edentulous.	147	0.0220 0.0462	15.0 31.9
(7) M., 70: O.D. 2 yrs., O.S. 18 mos. Unable to get around for past 2 mos.—Edentulous.	143 114	0.0594	33.8
(8) M., 68: O.S. 1 yr. 2 mos., O.D. 4 mos. Can get around.—Some teeth extracted.	160	0.0044	2.8
(9) M., 57: O.D. and O.S. 3 yrs. Can see to get around.—Dent. abrasion and caries.	138	0.0088	6.3
(10) M., 81: O.D. 14 yrs., O.S. several yrs. V.O.D. light and shadow. Can just get about.	161	0.0	0.0
(11) F., 56: O.D. 30 mos. Now practically useless. O.S. only refract. error.—Extr. of all upper teeth advised.	145	0.0044	3.0
(12) M., 81: O.S. 2 yrs., O.D. shortly afterwards. O.D. and O.S. light and shadow 2 bad teeth.	151 161	0.0418 0.0955	22.0 59.0
(13) Case history unknown.	121	0.0484	40.0
(14) Case history unknown. Black cataract.	206	0.0	0.0
(15) M., 73: O.D. 1 yr. 4 mos., O.S. 6 mos. later. V.O.D. light and shadow. V.O.S. c.f. at 2 ft.	147 140	0.0836 0.0132	56.8 9.4
(16) M., 55: O.D. 7 mos., O.S. 3–4 mos. V.O.D. light and shadow. V.O.S. 1/60.—Edentulous.	104	0.0418	40.4
(17) M., 73: O.S. 2 yrs.—light and shadow 6 mos. O.D. 18 mos. Chron. periapical infect. of teeth.	140	0.0396	28.3
(18) M., 74: O.D. and O.S. 2 yrs. Unable to read for the past yr.—Edentulous.	174	0.0154	8.9
(19) F., 72: O.D. and O.S. mat. catar., O.S. 1 yr. Now V.O.S. light and shadow. V.O.D. c.f. at 1.5 m.	158	0.0528	33.4
(20) M., 77: O.D. several years., O.S. 2–3 yrs. V.O.D. light and shadow. V.O.S. 3/60.—Edentulous.	152 134	0.0440 0.0176	28.3 13.2
(21) M., 75: O.D. 2 yrs., O.S. 1 yr. Pyorrh. alveolaris.	212	0.2200	103.7
(22) M., 74: O.D. 2–3 yrs. O.S. 4–5 yrs.—light and shadow 2 yrs.	122	0.0748	61.1
(23) F., 73: O.D. 1 yr., but it has been weak for a long time. O.S. 3 mos. V.O.D. light and shadow. V.O.S. 6/60.	102	0.0550	54.0
(24) F., 78: O.D. blind 2 yrs.; O.S. 2 yrs.—blind 3 mos.	170	0.0858	50.6
(25) M., 75: O.D. 1 yr.—floating shadow in field of vision., O.S. about 2 mos.—no floating shadow. V.O.D. 6/60. V.O.S. 6/20.—1. Chron. infection of 5 teeth.—Lens clear yellow.	175	0.0	0.0
(26) F., 75: O.S. 5 yrs.—now blind. Can read a a little with O.D.—edentulous.	148	0.0176	12.0
(27) M., 78: O.D. and O.S. 4 years. V.O.D. c.f. at 2 ft. V.O.S. 6/60.	187	0.0528	28.1
(28) M., 71: O.D. 10 yrs.—blind 5 yrs. O. S.5–7 yrs., now 1/60.	137 136	0.0704 0.0308	51.5 22.7

Series number, sex, age, and history (including duration of cataract)	Wt. of lens in mg.	Calcium	
		Mg. per lens	Mg. per 100 gm.
(29) F., 60: O.D. 1 yr., after an attack of scarl. fever and tonsilitis; eyelids became swollen and inflamed, which lasted 1 wk. O.S. failed later. Wassermann 4 plus. Only two teeth...	162	0.0242	15.0
(30) M., 55: O.S. 9 mos., O.D. later. Now V.O.S. c.f. at 1.5 ft. V.O.D. c.f. at 1 ft..	194 160	0.0440 0.0	22.6 0.0
(31) M., 72: O.S. 6 yrs.; O.D. 1 yr., following influenza	157	0.0616	39.3
(32) M., 83: O.D. 1.5 yrs.—now light and shadow. V.O.S. 6/30+1. Extr. of all teeth advised...	182	0.0968	53.2
(33) M., 66: O.D. 6 yrs.—a small stick happened to strike the eye, now blind. V.O.S. 6/15+2. Diab. 5 yrs.—Edentulous.	179	0.0352	19.7
(34) M., 78: O.D. 4 mos., O.S. later. Now V.O.D. light and shadow. V.O.S. 6/30.—4 teeth extracted	188 184	0.0264 0.0	14.0 0.0
(35) M., 85: O.S. 1 yr., soon after patient had struck his head in a fall. O.D. 9 mos. V.O.S. 2/60. V.O.D. 6/60	136	0.0198	14.5
(36) M., 60: Blurred vision 2 yrs., shortly after influenza. Pt. can get about. 6 teeth extracted	160	0.0154	9.6
(37) M., 67: O.D. 2 yrs., O.S. 1 yr. V.O.D. light and shadow. V.O.S. c.f. at 2 ft. 2 teeth extracted	156	0.0400	25.7
(38) F., 78: Combined extr. of rt. lens 8 yrs. ago with good results. V.O.S. light perception 1.5 yrs.	203	0.0888	43.7
(39) M., 83: O.D. 1.5. yrs., O.S. is failing. V.O.D. light and shadow. V.O.S. 6/30+1. Bad teeth	176	0.0555	31.5
(40) M., 79: O.D. and O.S. 10 yrs. Diplopia. V.O.D. 6/20−1. V.O.S. 6/20.	193	0.0488	25.3
(41) M., 74: O.S. 2 yrs., O.D. 1.5 yrs. Gets around fairly well	147	0.0446	31.8
(42) Case history unknown	140	0.0932	66.8
(43) F., 75: O.D. 2 yrs. O.S. 1.5 yrs. O.D. and O.S. light and shadow. Weak eyes since childhood.—Edentulous	75	0.0710	95.0
(44) F., 75: O.D. 2–3 yrs., O.S. shortly afterward. O.D. and O.S. light and shadow	170	0.1177	69.6

Key to less usual abbreviations: O_s = both eyes, c.f. = counts fingers.

Disorders or absence of the thyroparathyroid glands have been reported in frequent association with cataract by Lenhard.[5] Moreover, Kerr, Hasford, and Shepardson[6] have reported partial cures of senile cataracts on several occasions by administering desiccated thyroid to the patients. Fischer and Triebenstein[7] have stated also that in about eighty-eight per cent of cataract cases there is a disposition to tetany. However, Eiseman, and Luckhard[8] reported that cataracts did not develop in the dogs in which tetany was produced by calcium deprivation and other means.

Summary

Analyses of forty-five human cataractous lenses for calcium gave an average value of 35.4 mg. per 100 gm. with a range of variation of 2.8 to 108. No calcium could be demonstrated in five lenses with incipient cataract. One black cataract, the only one examined for calcium, likewise contained none.

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Table 2

CALCIUM VALUES OF THE CATARACT LENSES IN ORDER OF AGE OF PATIENTS, WITH APPROXIMATE DURATION OF CATARACT FOR EACH EYE.

Series number (See table 1)	Age	Approximate duration of visual disturbance—years	Mg. calcium per 100 gm.
3	54	1.5, 5	19.1
16	55	0.3, 0.5	40.4
30	55	2, 0.7	22.6, 0.0
11	56	2.5	3.0
9	57	3	6.3
2	58	0.5, 4	94.1
29	60	1	15.0
36	60	2	9.6
5	62	1	35.7
33	66	6	19.7
6	67	several	15.0
37	67	1, 2	25.7
8	68	0.3, 1.2	2.8
7	70	1.5, 2	31.9, 33.8
28	71	5, 10	51.5, 22.7
19	72	1	33.4
31	72	1	39.3
15	73	0.5, 1.3	56.8, 9.4
17	73	1.5, 2	28.3
23	73	0.3, 1	54.0
22	74	2, 5	61.1
18	74	2	8.9
41	74	1.5, 2	31.8
21	75	1, 2	103.7
25	75	0.2, 1	0.0
26	75	5	12.0
43	75	1.5, 2	95.0
44	75	2, 3	69.6
20	77	2, several	28.3, 13.2
24	78	2	50.6
27	78	4	28.1
34	78	0.3	14.0, 0.0
38	78	8	43.7
40	79	10	25.3
12	81	2	22.0, 59.0
10	81	14	0.0
4	82	several	45.6
32	83	1.5	53.2
39	83	1.5	31.1
35	85	0.7, 1	14.5

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VASOMOTOR GLAUCOMA

Report of a case

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AND
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In this case the amount of hypertension fluctuated with variations in vasomotor control. The glaucomatous changes showed no increase in the course of six years of observation. Decided improvement followed the use of adrenalin and glaucosan, both vasomotor stimulators.

Some connection of the vascular system with glaucoma was early recognized, and observers with the ophthalmoscope were disappointed at the lack of retinal hemorrhage which they thought should have accompanied the vascular congestion.

We find most of the modern work aimed at general and medical treatment and explanation of the etiology on that basis. Thus hypertonic salt solution intravenously and restoration of calcium balance are recommended. A new derivative of adrenalin, called glaucosan, has been evolved, the discovery of which has brought new interest to the etiology of glaucoma and particularly to the rôle played by the vasomotor system. C. Hamburger, the originator of glaucosan, argues that glaucoma must depend on an inhibition, more or less complete, of the vasoconstricting mechanism, producing relaxation of the vessels and consecutive repletion of the eye with blood. This is pronounced in the choroid.

Hamburger also notes the frequency with which glaucoma follows shock or other nervous disturbance, and concludes that a paresis of the sympathetic nerve may cause stasis of the intraocular vessels. When this occurs suddenly the glaucoma assumes the inflammatory form. The association of the sympathetic with glaucoma is an old observation. Years ago removal of the cervical ganglion was recommended and some cures were reported.

That intraocular pressure varies directly with the blood pressure has been proved experimentally, but not verified clinically by many oculists. It has been demonstrated, however, that it varies closely with the venous pressure. These variations are, however, only temporary.

Recently Kronfeld of Vienna performed an interesting experiment on the formation of the aqueous. He drew off the aqueous and took repeated measurements with the tonometer as it reformed. There was a steady rise in pressure until slightly over normal, and then a fall from normal. In arterial congestions of the head, the tension recovered more quickly and went higher; while under adrenalin it recovered more slowly and did not go so high. Kronfeld concludes that the amount of inflow of aqueous depends mainly on the capillary blood pressure and the permeability of the lining membrane, and that these two factors are in intimate relationship to the caliber of the intraocular vessels.

In the light of this experiment, we can readily understand the effect of vasomotor disturbance in precipitating an acute attack of glaucoma, and also that in certain individuals a chronic fluctuating form would be quite probable.

In the literature, we can find no such case reported clinically, although much theory and experiment on animals are in evidence. In 1919 Dr. Hans Barkan reported a case of glaucoma accompanying an angioneurotic edema of the lip. This acute attack cleared up without any permanent damage. Acute attacks of glaucoma accompanying the menstrual period are also known.

Case report: Mr. L. D., aged thirty-six years, was first seen in 1924 com

plaining of poor vision and attacks of headache with blurred vision. His father had had cataract, and his sister had suffered with asthma. The patient had always had poor vision which had been variable from day to day. At three years of age he had fallen from a cart, and he thought he had fractured his skull. He had tried many doctors but had not been helped. The vision of the right eye with a minus 4.00 sphere was 3/10 and Jaeger 5. The vision of the left eye with a minus 5.00 sphere was 1/10 and Jaeger 5. Each eye showed a central corneal opacity which appeared to be a remnant of an old interstitial keratitis. He had an alternating strabismus. The fundi were normal. The discs showed no excavation and the fields were normal. The tension with the McLean tonometer was 42 mm. in both eyes. In view of the hypertension present he was given one percent pilocarpin three times a day, and told to return in one week for observation.

A careful investigation of his complaints brought out the additional information that for years he had been able to read the newspaper only twenty minutes at the best. After meals, especially lunch, his vision would become hazy, and would be associated with rainbow rings and suboccipital headache. This might last all day or wear off in one hour. During this period he would not be able to read at all, or at best for five or ten minutes. The same had been apt to occur as result of hurrying at his work in a grocery store, or on putting his head back in a barber's chair. At this time also there would be a buzzing in his ears and hearing would be duller. In a train, when leaning his cheek on his right hand, he had felt the right cheek to be flushed, and had noticed the vision of the right eye to be blurred. Unpleasant sights and smells would bring on a headache but no blur.

He returned one week after starting pilocarpin with the report that the blur and headache had been much less after meals and after reclining in a barber shop chair. After the latter he could return to work right away, which he had not been able to do previously because of dense fog and bad headache. The tension was 37 mm. each eye with the McLean tonometer. The pilocarpin was continued.

One week later he had less headache, but always had some after meals. He felt that his eyes were worse in the morning and clearer in the afternoon. A series of tonometer readings (McLean) showed that at eleven a. m. the tension of the right eye was 52; left eye, 37 mm. The next day at three p. m. the tension was right 36; left, 38 mm. The following day at eleven a. m. the tension was 40 mm. on the right and 32 mm. on the left.

Three months after starting pilocarpin, he was better in many ways than before, but saw "darker" with the drops, probably due to the small pupil and the central opacity. He went without drops four days and the only difference was more light, but his reading was not so clear. He was uncertain whether he liked the drops or not. A subconjunctival injection of ten minims of 1 to 1000 adrenalin was then given for the right eye. Following this the tension was right 32; left 38 mm. For three days after the injection, the vision of the right eye was clearer than the left, and clearer than it had ever been before. He went to the barber shop as an experiment; rings appeared before the left eye, but not before the right eye. Several injections were given with the same temporary improvement, and then the vision would return to the former state.

An examination by his physician, except for low blood pressure findings, was negative. Another subconjunctival injection of adrenalin cleared his vision for three hours. An operation was considered, and then the man disappeared.

He was not heard from again until five years later, in October, 1929, when he returned to ask if any new treatment had been discovered for glaucoma. His complaints were unchanged. Tension (McLean) was right, 38; left, 38 mm. There was a slight enlargement of the

blind spot of the right eye. Levoglaucosan was instilled in both eyes as prescribed by Hamburger. Tension on the right became 28; left, 26 mm.

In three weeks he returned with the observation that his distant vision was much better, for he now saw street car numbers across the street, whereas formerly he did not know that they were there. The first week he read a great deal and could hold the book further off. The blurring spells and headache were almost absent. He felt like a different man. His hearing was also better. He had a cold for a few days and his eyes were worse. The effect of the drops seemed to be wearing off. Wondering how much the dilated pupil had to do with improved vision, we made a check with euphthalmin. Tension before euphthalmin: right, 39; left, 35 mm. After euphthalmin: right, 40; left, 38 mm. Vision was no clearer. Glaucosan was again given with the same good results. He was given a prescription for glaucosan, carefully instructed in its use, and told to use it every three weeks or as soon as the effect appeared to be wearing off. Examination one week ago showed the tension in both eyes to be 22 mm. Subjectively there is still improvement.

To summarize, a case of intraocular hypertension is presented, showing the following: (1) tension of a fluctuating character; (2) subjective symptoms of hypertension increased under conditions of loss of vasomotor control; (3) no progression of glaucomatous changes over six years observation; (4) marked improvement with adrenalin and glaucosan, which are vasomotor stimulators.

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INTRAOCULAR FOREIGN BODIES

A review of 101 cases

CHARLES NELSON SPRATT, M.D., F.A.C.S.

MINNEAPOLIS

The author has seen 101 intraocular foreign body injuries in ninety-eight individuals among 15,000 eye patients in the last twenty-five years. He discusses the location and type of the foreign bodies, and the diagnosis, treatment and results of these cases. Read before the Minnesota Academy of Medicine, March 12, 1930.

In twenty-five years of private practice, about 15,000 eye patients have been seen at my office. Among this number there were ninety-eight individuals with a total of one hundred and one eye injuries caused by intraocular foreign bodies. This gives an incidence of 1 to 150 patients. It is of interest to note that in one year there were eleven cases, while in three different years not a single one was encountered. This is not a large number compared to that seen by some ophthalmologists located in large industrial centers or connected with large clinics; nevertheless, a review of these cases may be of interest.

There were ninety-six men and two women. The ages varied from eight to seventy years, the majority being between twenty and fifty, which is the active working period of most men's lives. The right and left eyes were injured practically the same number of times, the former being involved fifty times and the latter fifty-one times. Three of these patients had both eyes injured. In one case, shot was present in each eye; in another, copper entered each eye following a dynamite explosion; and in a third, copper was blown into one eye and stone into the other. Another patient had two pieces of steel in one eye.

Location

Twelve of the foreign bodies were located in the anterior chamber, fourteen in the lens, sixty in the vitreous, seven posteriorly in the sclera, and eight in the orbit. The foreign bodies were of steel in eighty-three cases, lead in nine, copper in four, stone in four, and zinc in one.

The eighteen nonmagnetic foreign bodies were located as follows: one in the anterior chamber, five in the lens, and twelve in the vitreous. Nine of these latter were lead; in each case vision was lost. Five of the eyes were enucleated, and four left in place, although blind. Stone was present in four eyes. In one case the particle was located in the lens, and the eye was

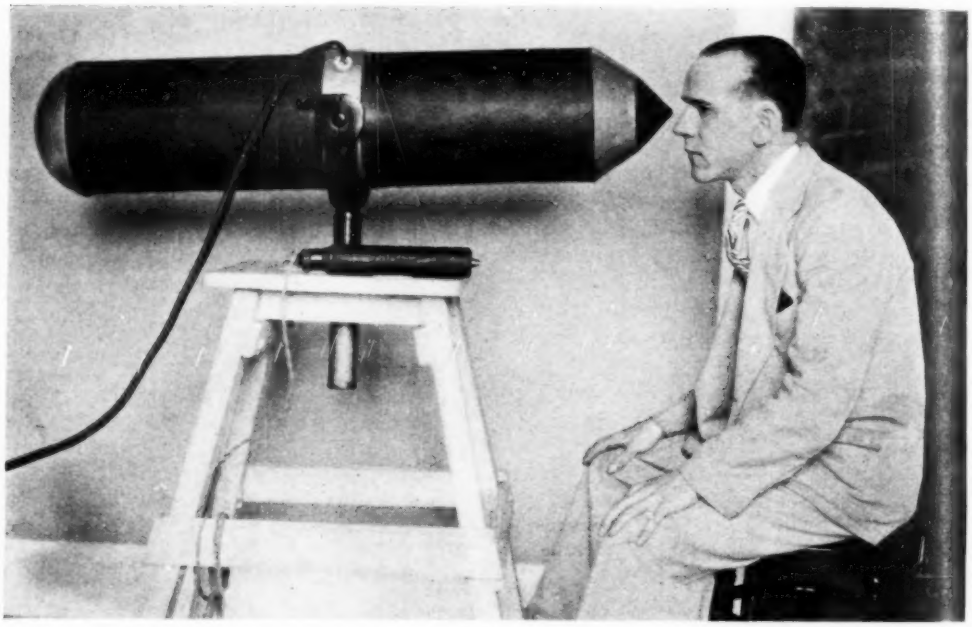
TABLE GIVING SUMMARY OF LOCATIONS AND RESULTS IN 101 CASES OF INTRAOCULAR FOREIGN BODY

Location	Total	Enucleated	Nonmagnetic			Steel—Magnet operation 58 cases						Not treated—21 cases		
			Total	Vision		Anterior	Vision		Posterior	Vision		Total	Vision	
				good	poor		good	poor		good	poor		good	poor
Ant. Chamber	12		1	1		11	10	1						
Lens	14		5	2	3	6	2	4				3	2	1
Vitreous	60	3	11	1	10	12	5	7	27	9	18	5	2	3
Sclera	7								1	1		7	4	3
Orbit	8	1	1		1				1		1	6	3	3
	101	4	18	4	14	29	17	12	29	10	19	21	11	10

enucleated on account of infection; in a second, the stone was in the anterior chamber and was removed with forceps with resulting normal vision; and in two other cases the lenses were injured with resulting traumatic cataracts. The vision is unknown.

Of the four cases with copper in the interior of the eye, two were in the vitreous; one was removed through a scleral incision with resulting vision of 5/12; the other eye, being infected, was enucleated. In two others, the copper particle, which was in the lens, was removed with the traumatic cataract. Vision of 5/5 with the proper correcting glass was obtained. The one eye with a particle of zinc imbedded posteriorly in the sclera required enucleation on account of an iridocyclitis.

Among the eighty-three cases where steel was present, four eyes were so severely injured or infected that an evisceration was done without any attempt being made to remove the steel. In three of these the steel was in the vitreous, and in one in the orbit. There were twenty-one patients who refused operation or upon whom no operation beyond the magnet test was attempted, for the particle of steel either was in the lens and the vision was still good, although a partial cataract was present; or it was located posteriorly in the sclera or orbit and could not be dislodged. Of the twenty-one patients whose eyes containing steel were not operated upon, three were in the lens, six in the vitreous, seven in the sclera, and five in the orbit. Bulson, of Fort Wayne, has reported three cases in which foreign bodies were retained in the eye for a number of years, and he states that it is not as serious as it was formerly considered to be.



Intraocular foreign bodies (Spratt). Showing unusually large giant magnet and small hand magnet.

The magnet operation for the removal of steel was done fifty-eight times. The results of the operation varied, being much better when the steel was in the anterior portion of the eye than when it was situated posteriorly. The pieces of steel in the anterior chamber or in the iris were all removed through a corneal incision with the small magnet; nine obtained practically normal vision, and two had

vision of 5/30 due to partial traumatic cataracts. No eyes were lost.

Six patients had steel in the lens. Four eyes were enucleated on account of infection or iridocyclitis, and two obtained practically normal vision after the removal of the traumatic cataract. Of the thirty-nine patients with steel in the vitreous, in twelve the foreign bodies were removed through a corneal incision, the particle being first drawn forward around the lens into the anterior chamber with the giant magnet. Five had good vision and seven no vision. In twenty-seven cases the steel was removed through a scleral incision, with eight good results and nineteen with poor vision or loss of the eyes. This makes a total of thirty-nine cases, thirteen with good vision and twenty-six with poor. In two of these latter, traumatic cataracts were present, which could have been removed with probable good vision. A glance at the table herewith will show that the results in the cases where the foreign body was not removed were better than those in which the operation was done. This is explained by the fact that the former cases were not infected and the foreign bodies were small. In the table, vision of 5/12 or better has been considered good vision, below 5/12 as poor vision.

Diagnosis

The **magnet test** to determine the presence of a foreign body in the eye, which was suggested by MacHardy in 1881, has been quite unreliable in my experience, for among the twenty-one cases where it was impossible to remove the steel by the giant magnet, seventeen gave a negative response to the test. This is due to several factors: first, the foreign body may be firmly imbedded in the tissue, or may have been there so long that it is encapsulated; second, the foreign body may be so small or so far from the magnet that there is no sensation of pain or pull; third, the foreign body may be lead, stone, copper, or some form of nonmagnetic steel; and fourth, the foreign body may have disintegrated so that nothing remains but rust. In all these cases the x-ray would be positive, as even iron rust casts a shadow.

In 1842 Meyer of Minden made an unsuccessful attempt to remove a foreign body from the eye with a magnet. The first authentic removal of a foreign body from the interior of the eye was done by Graefe in 1845. The extraction was accomplished with forceps, through the wound of entrance. In 1859 Dixon of London removed a piece of scissor blade which had been in the vitreous for four weeks by means of a magnet. The eye was lost. In 1875, McKeown of Belfast inserted the tip of a magnet into the vitreous through a scleral wound, and then removed the foreign body from the wound with forceps, a large permanent magnet having been used to draw the foreign body to the sclera. The eye was saved. In 1879, Hirschberg of Berlin made the first use of the electric magnet. This invention opened a new field for the treatment of intraocular foreign bodies. He reported in 1882 a large series of cases in which his magnet was used. Another name often associated with the electric magnet is that of Haab, of Zurich, who in 1892 brought out his "giant magnet". This magnet is 60 cm. long, has a 10 cm. core, weights 75 pounds, and is wound with 300 pounds of copper wire. It uses 20 volts at 20 to 30 amperes. Haab always favored the method of drawing the particle of steel around the lens into the anterior chamber, while Hirschberg preferred the posterior route where the foreign body was removed through an incision made into the sclera.

In 1880, Pooley of New York suggested the use of a **sideroscope** to determine the presence of a foreign body in the eye. This was fairly accurate in foreign bodies weighing as little as one-half a milligram, and as most foreign bodies weigh two milligrams or more, this was used extensively until 1895, when Roentgen of Wurzburg gave to the world his great discovery.

In March 1896, Van Duyne first showed the presence of a foreign body in the eye by means of the **x-ray.** Since then the x-ray has been used in various

ways to determine the presence of a foreign body in the eye—the graphic, the stereoscopic, and the geometric. The last is the one generally employed if accurate localization is desired. The method which has been used by me since 1905 is a modification of the Huhlen method. By means of a suitable apparatus, two x-ray plates are exposed laterally on the side of the injured eye, the x-ray tube being moved a known distance between the two exposures. There are cross-wires on the plate holder, which cast shadows on the plates, making base lines from which measurements can be made. The distance between the x-ray tube and the plate can be accurately measured, and the shadow cast by the steel can be plotted on ordinary paper, measurements being taken between the shadow of the cross wire and the shadow of the foreign body. In order to have some definite position from which to locate the foreign body, a small lead ball is placed a definite distance in front of the center of the injured eye. From the triangulation of this marker, the location of the foreign body may be determined accurately. I have checked this method in a number of cases where the foreign body was visible in the iris, the lens, or the vitreous, and I think the error is less than 0.5 mm. The method of Sweet is the one most commonly in use in this country. This was suggested by him in 1897 and improved in 1910.

Four of the cases were previously reported negative by roentgenologists. In one of the series the clinical symptoms indicated a foreign body, but it was not definitely proved until five x-ray pictures had been taken. Dr. C. W. Donaldson has reported a case where a foreign body was overlooked, as the shadow was overlapped by the shadow of the heavy bones forming the orbital rims. This illustrated the necessity of more than one x-ray plate taken at different angles. Dr. Donaldson also reported a case in which the fact that a foreign body was reported apparently present was due to a defect in the intensifying screen.

Technique

In referring to the giant magnet, the photograph gives some idea of the magnet used in many of these cases. This was constructed especially for me about twenty years ago from specifications suggested by Dr. Lancaster of Boston. The core is one meter long and 12 cm. in diameter, consisting of a portion of wrought iron shaft from one of the old Minneapolis flour mills. The winding consists of 7,000 feet of number 11 wire. It uses 60 amperes at 220 volts. This magnet is more than four times the size of the ordinary giant magnet, and will, at 2.5 cm. from the tip, pull with more than twice the effect.

Of course it is not as easy to use as is the hand magnet, but where the foreign body is at a distance from the point of the magnet, the pulling force is much greater than that of the hand magnet. In the illustration this is shown on the table-top. At contact, the hand magnet will give about the same pull as the large one, as most foreign bodies are small and cut approximately the same magnetic lines on the small magnet as on the large. Therefore, when the point of the magnet can be brought in contact with the steel or iron, I prefer to use it rather than the giant. The giant magnet is of especial use where the foreign body is deep in the vitreous or attached posteriorly to the retina or the sclera. The particle of steel may be pulled forward around the lens to the anterior chamber, and then extracted with the small magnet through an incision in the cornea.

Where the lens has not been injured by the foreign body it is preferable to raise a flap of conjunctiva and make an incision through the sclera at the ora serrata, and insert the point of the magnet through the lips of the wound. The removal by the posterior method avoids a possible injury to the lens. In Boston this is the favorite method of removal, while in New York the method of Haab, in which the foreign body is pulled around the lens and into the anterior chamber, seems to be favored. In a certain number of cases, the iris and lens may be injured by this procedure.

Results and prognosis

The results of eye injuries due to intraocular foreign bodies depend on the following factors:

(1) Infection. This is a serious complication. We make operative wounds of the anterior or posterior chambers of the eye, as in the skull or abdominal cavity, with little or no risk. However, a wound produced by an infected foreign body is most serious in an eye. Unfortunately, it seems that there are now more infected foreign bodies than there were in former years. In the days of the village blacksmith, many injuries were caused by hot pieces of steel or burrs broken from hammers or chisels that were rendered sterile by the heat generated by the impact of metal on metal. In recent years, particles coming from autos are covered with grease and the dirt of the road. I have had two or three cases in which a hypopyon cleared up after the removal of a foreign body. The injuries caused by nonmagnetic particles, copper and lead, are usually infected. No matter how small the foreign body or how skillfully it is removed, if infection is a serious complication, the loss of the eye is almost certain to result from chronic iridocyclitis or panophthalmitis.

(2) Diagnosis. Intelligent treatment depends not only on the definite knowledge of the presence or absence of a foreign body, but also on its accurate localization. A good x-ray picture should be made of every suspected eye. Shall we attempt to remove it by the anterior or corneal route, or through an incision posteriorly in the sclera? If the foreign body is imbedded in the sclera and cannot be dislodged, it is better surgery to allow it to remain; if in the anterior orbit, removal is generally possible, but if in the posterior orbit, it will cause no special harm and no attempt at removal is warranted.

(3) Location. Foreign bodies in the anterior part of the eye cause less damage than when in the vitreous or posteriorly in the sclera or retina. Slight infection is better borne by the anterior chamber than by the vitreous. Most cases of double penetration of the eye, where the foreign body is in the orbit, result favorably unless infection is present.

(4) Size. The size of the foreign body is of some importance in that a large particle will cause considerable contusion. Hemorrhage in the vitreous and detachment of the retina with loss of vision is more certain with a large foreign body than with a small. Most foreign bodies are small, sharp fragments, being pieces of burrs or chisels, and make a clean cut on entering the eye. Injuries from pieces of shot usually cause considerable contusion.

(5) Material. The material of which the foreign body is composed is important, not only from the question of the magnet operation, but also from the chemical action on the tissues. Glass is well borne, while copper, according to Leber, is apt to cause suppuration and uveitis, due to the action of the chemicals on the tissue. Iron and steel produce a condition known as siderosis or rust-staining.

(6) Time. The length of time that the foreign body has been in the eye is a factor of least significance. Foreign bodies often become encapsulated and remain quiet for years. On the other hand, the sooner the foreign body is removed, the less the danger of infection. In very recent cases, the foreign body may be removed through the original wound of entry. Several of these cases not operated on gave a history of injury several months or years previously.

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INCLUSION BLENNORRHEA

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In 2,446 deliveries at the Saint Louis Maternity Hospital, there were four cases of what is known as inclusion blennorrhea. Material from the eye of such a case was inoculated into the conjunctiva of a monkey with an apparently positive result. There is a type of ophthalmia neonatorum characterized by a much later onset than occurs in gonorrheal blennorrhea and by the presence of follicles and of inclusion bodies. This disease, which may be transmitted by contact, is probably more common than usually stated. The significance of epithelial cell inclusions is as yet purely hypothetical. From the Department of Ophthalmology, Washington University School of Medicine.

The various types of ophthalmia neonatorum are usually regarded as being caused by specific microorganisms, the most important common parasite being the gonococcus. The presence of gram-negative, intracellular diplococci in direct smears from the conjunctiva of the newborn child is sufficient presumptive evidence for considering the case one of gonorrheal blennorrhea and for proceeding at once with suitable therapy.

During the past eighteen months we have been called in consultation to the wards of the Saint Louis Maternity hospital on twelve cases of severe purulent conjunctivitis occurring in 2,446 deliveries. As a routine procedure, a fresh one-percent solution of silver nitrate is instilled into the conjunctival sac of every new-born infant immediately after birth, then freely flushed out with a normal saline solution.

In the twelve cases under consideration the onset of the clinical signs of conjunctivitis varied from six hours to thirteen days post partum. When first seen these cases were apparently identical; the lids were edematous, swollen, and could be separated only with difficulty. There was a frank purulent discharge which rapidly accumulated after irrigation of the cul-de-sac. The conjunctiva was thickened, red, and bled easily on manipulation. No case was complicated by corneal involvement. As a result of exhaustive investigation, it was found that these twelve cases fell into **three distinct categories,** as follows:

1. Two cases. The onset of clinical signs of conjunctivitis was observed as early as six hours after delivery in one of these infants, and Gram-negative, intracellular diplococci were found at that time. The delivery had been long and complicated, the head of the infant having remained in the lower birth canal for approximately thirty-six hours before delivery.

The onset of the purulent discharge in the other case was observed seventy-two hours after delivery, and at this time many gonococci were present in the direct smear. These cases were studied daily by smears and epithelial-cell scrapings, as described by Howard, using both the Gram and the Giemsa stains. Gram-negative, intracellular diplococci were present as late as the forty-second day in the second case. At no time were epithelial-cell inclusions noted. The eyes of both infants yielded satisfactorily to treatment. These two cases were definitely diagnosed as gonorrheal blennorrhea.

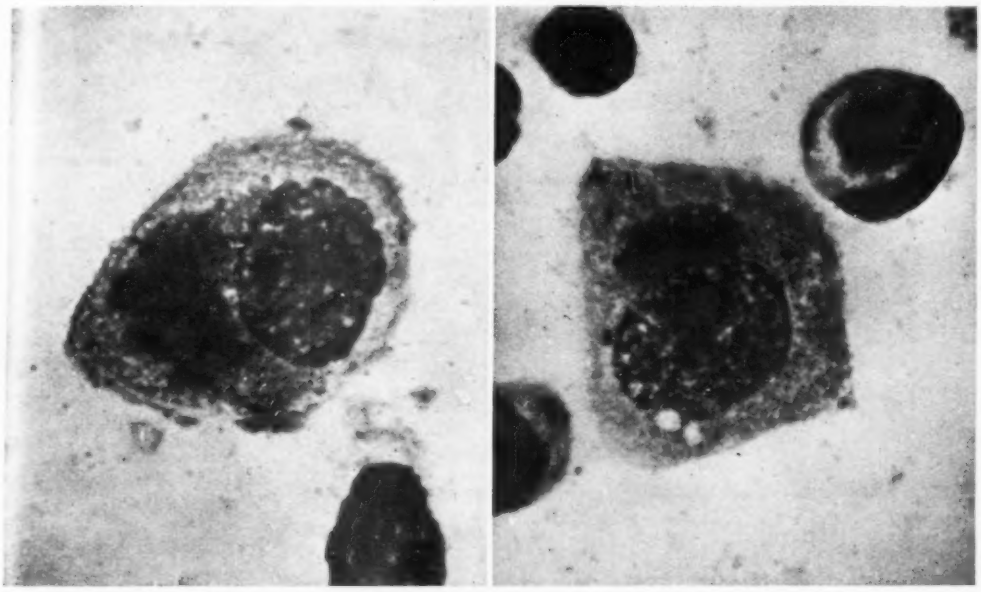
2. Six cases. The nurse observed a profuse discharge of pus from the eyes on the first or second morning following delivery. Numerous smears, scrapings, and cultures were uniformly negative. The discharge subsided rapidly with the use of a mild astringent and frequent, cold normal saline irrigations. Since no bacterial parasites or inclusions were found it was finally decided that we were dealing with a silver nitrate reaction; in other words, a silver nitrate blennorrhea (Axenfeld).

3. Four cases. The signs of conjunctival involvement were noted on the fifth, eighth, eleventh, and thirteenth days post partum, respectively. The infants' eyes previously had appeared to be quite normal. The first indication

that they were not normal was that the babies kept their eyes closed. When the lids were separated there was a free discharge of pus. Direct smears and scrapings, made repeatedly from the conjunctivas, were uniformly negative for the presence of bacteria; cultures also were without result. Epithelial scrapings, stained by the Giemsa method, showed the presence of numerous epithelial-cell inclusions in every case.

From this group of inclusion blennorrheas (figures 1, 2) cultures were made on blood agar and the leptospira medium of Noguchi. Staphylococcus albus and bacillus xerosis were present in two cultures, but being saprophytes they have no pathogenic significance.

Rabbits were inoculated from two of these cases by scraping the conjunctiva



Figs. 1 and 2. (James). Single epithelial cells with inclusion bodies in cytoplasm near nucleus.

These cases were isolated, and treated locally with cold saline irrigations, ice compresses, and instillations of a mild antiseptic every three hours. The edema of the lids and profuse purulent discharge subsided in five to seven days, the conjunctiva, however, continuing to be inflamed and thickened. As the discharge diminished, numerous tiny papillary and follicular elevations appeared in the tarsal and retrotarsal conjunctiva. This condition persisted for a period of four to six months, with only a minimal amount of mucopurulent secretion. The follicles and general hyperplasia gradually subsided, in the end leaving the conjunctiva smooth and clear. At no time was there evidence of corneal involvement. These four cases were, therefore, typical inclusion blennorrheas.

of the infant and transferring the material directly to the scarified conjunctiva of the rabbits; this, however, caused no evidence of irritation.

Scrapings from the conjunctiva of one case were directly inoculated into the scarified conjunctiva of a rhesus monkey which until that time had been free from conjunctival irritation. A saline emulsion of the material obtained by scraping the conjunctiva of the infant was inoculated directly into the retrotarsal fold of the left upper lid. Seven days after inoculation a moderate mucopurulent discharge was noted in both eyes, but the conjunctiva was only slightly congested. Unfortunately no scrapings or smears were taken from

the monkey at that time. The discharge subsided spontaneously in four days.

On the twelfth day after inoculation, tiny translucent discrete follicles, 0.5 to 1.0 mm. in diameter appeared in the upper and lower retrotarsal folds. Scrapings and smears taken at this time were studied by a member of the bacteriological staff of the eye department, but neither organisms nor inclusion bodies were seen. A small piece of tissue removed from the retrotarsal fold was fixed in formalin (ten percent solution), sectioned and stained by hematoxylin-eosin and by the Giemsa method. These sections were examined by Dr. Harvey Lamb, who reported typical follicle formations such as are found in trachoma. (Figure 3.) Numerous scrapings were made in an attempt to demonstrate inclusion bodies, but none were found.

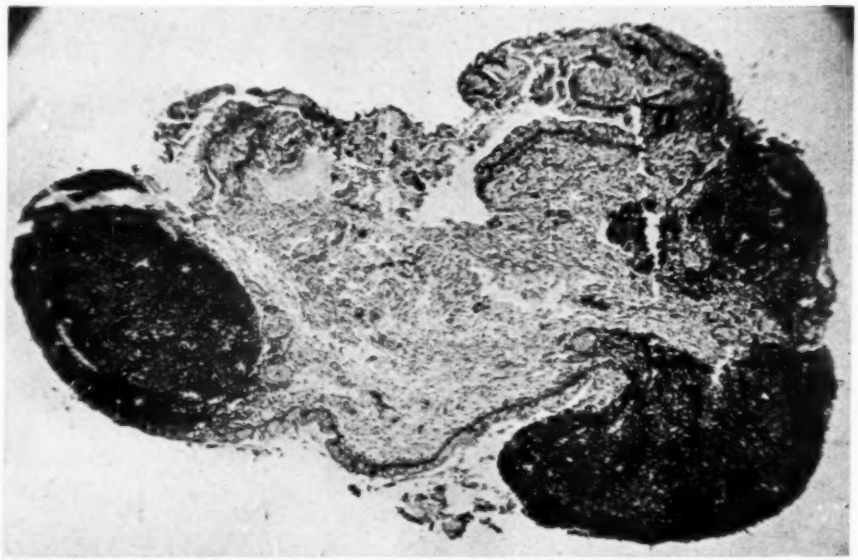


Fig. 3. (James). Section of material excised from retrotarsal fold of monkey no. 4, showing discrete follicles composed of epithelioid cells and numerous lymphocytes. Conjunctiva intact.

The follicles have gradually subsided during the past seven months, so that the conjunctiva is almost normal, except for the scarring due to tissue removal, and for a few pale follicles in the lower conjunctivas; the upper conjunctivas are pale and smooth. The suggestion was made that we were dealing with a spontaneous folliculosis which affects monkeys. The animal, however, had previously been free from follicles and the other monkeys in the same quarters remained free from conjunctival involvement.

In two of the cases of inclusion blennorrhea, smears and scrapings from the vagina and cervix of the mothers were made and stained by Gram and Giemsa methods. The multitude of organisms present, however, completely vitiated a satisfactory examination for gonococci or epithelial-cell inclusions.

At this point it is opportune to report findings on another case which was brought to our attention through the courtesy of Dr. John McGrath of Saint Louis. His patient, a mother, presented a clinical picture of typical inclusion blennorrhea, which had developed twenty-eight days after the birth of her child, and was confined to the right eye. We were given the opportunity of examining scrapings made from the conjunctiva of this woman, and found inclusion bodies, although few in number. Data obtained from the patient indicated that her infant had developed

a conjunctivitis ten days after birth, which subsided after local treatment. Although this child was not under Dr. McGrath's care, and no scrapings were obtained, its history indicated an indubitable inclusion blennorrhea.

Due to the frequent suggestions that gonorrheal ophthalmia, inclusion blennorrhea, and trachoma are possibly the result of the same etiological agent, attempts were made to demonstrate the presence of inclusion bodies in the cases of gonorrheal ophthalmia of the newborn, but with negative results*. Scrapings were also examined from the vaginas of twelve children, three to twelve years of age, who were suffering from gonorrheal vaginitis. These were all negative for inclusion bodies.

Discussion

Inclusion-body conjunctivitis is a condition usually found in the newborn and is probably the result of infection during the process of delivery. (Heymann no. 1, Aust.) The onset of the disease is later than that observed in the more common types of ophthalmia neonatorum, the average in the cases here reported being nine days postpartum. It is marked by the signs of an acute purulent conjunctivitis, and is characterized by the formation of follicles in the retrotarsal folds, by a granular appearance of the tarsal conjunctiva, and by the presence of cell inclusions. It runs a moderately severe course and is but little affected by treatment. The disease lasts from two to four months and after subsidence leaves the conjunctiva entirely normal. (Fuchs.)

The relatively infrequent reports of this affection in the literature are probably due to the fact that epithelial scrapings and staining with Giemsa's solution are not included in the routine technique. The statement made by Parsons that sixty to seventy percent of the cases of ophthalmia neonatorum are due to the gonococcus and that colon bacilli, pneumococci, and streptococci are responsible for the remainder does not tell the whole story. In view of the alarming severity of the initial process, the long duration of the disease, and the possibility of contact infection, it is well to recognize the condition early. This can be done only through the proper methods of laboratory examination. The outcome of this process is very reassuring (Botteri).

The significance of the so-called trachoma bodies (epithelial-cell inclusions) has been extensively investigated by Noguchi and Cohen. They personally examined over ten thousand scrapings from a variety of conjunctival conditions, but were unable to demonstrate epithelial-cell inclusions in specimens from the normal conjunctiva of either white or colored newborn children, nor in the following affections: acute and chronic catarrhal conjunctivitis, conjunctivitis associated with the acute exanthemata, conjunctivitis due to the presence of foreign bodies, conjunctivitis following the use of atropin, in vernal catarrh, and in folliculosis of the conjunctiva (Saemisch). They conclude that the absence of inclusion bodies in this group of cases disproves the theory that the inclusions are the result of local irritation, be it mechanical, chemical, inflammatory, or toxic.

These investigators found inclusion bodies in nine out of sixty-six cases of marked conjunctivitis follicularis*. In the examination of sixty cases of trachoma, epithelial-cell inclusions were demonstrated in thirty-six instances, or

* Howard, in reporting a number of cases of inclusion blennorrhea, describes his finding of inclusion bodies and gonococci in conjunctival scrapings taken from the same infant, and shows a picture of one of these epithelial cells with gonococci on the surface and inclusion bodies within the cell. The gonococci quickly disappeared following the use of silver solutions, but the inclusions persisted for several months. In other words, he considers this case one of double infection and does not believe that the inclusion bodies found in the epithelial cells of inclusion blennorrheas have anything to do with the presence of a gonococcal infection.

* Howard (personal communication) questions whether inclusion bodies found in follicular conjunctivitis are identical with those found in inclusion blennorrhea and trachoma. See also reference to Taborisky.

in sixty percent of the cases. In the twelve cases of gonorrheal blennorrhea of the newborn which they examined, the gonococcus was found in every instance, but there were no inclusion bodies. In six infants with nongonococcic blennorrhea, cell inclusions were uniformly demonstrated. The eye of one mother in this group became infected, and the second eye succumbed a week after the onset of symptoms in the first eye. Follicles were present and inclusion bodies were observed in the conjunctival scrapings. Scrapings taken from the urethra and cervix from three mothers were negative for inclusion bodies.

Noguchi and Cohen, therefore, suggest that, when found in trachoma, nongonorrheal ophthalmia neonatorum, and gonorrheal ophthalmia in children, the inclusion bodies represent an etiological factor in an independent conjunctival affection which is not complicated by pannus or cicatrization and which clinically resembles trachoma with acute manifestations, or the papillary stage of gonorrheal ophthalmia. On this hypothesis the presence of the so-called inclusion bodies in trachoma and in gonorrheal ophthalmia would be the result of the engrafting of the disease caused by these bodies on the original affection.

Many additional attempts have been made to determine the significance of the epithelial-cell inclusions which were first demonstrated by Halberstaedter and Prowazek in 1907. Their presence in trachoma is especially noteworthy in view of the theory of genital trachoma which has been suggested by Lindner.

Gebb attempted to produce trachoma in adults by inoculating directly from cases of inclusion blennorrhea of the newborn, from which he had isolated many inclusion bodies. He was unable to produce anything resembling trachoma either by direct inoculations or by repeated transplants.

Fodor has recently reported a case of inclusion blennorrhea in the newborn, gonococci being found in the vaginal secretion of the mother. He also found structures which he considers to be the transition forms of the gonococcus to inclusion bodies.

Among others (see Heymann no. 2, table 2; Lindner no. 2, 1913; Löhlein, 1912; Axenfeld, 1914) Botteri has not only made clinical and microscopic observations on twenty-one cases of inclusion blennorrhea, but has also carried out experimental investigations by inoculating material from these cases into the conjunctivas of two baboons and one rhesus monkey. The results were uniformly successful and paralleled the course of the affection in human subjects. It is interesting to note in this connection that, according to Lindner (quoted by Axenfeld, p. 138), the literature describing experimental blennorrhea reports only one failure to produce the disease; that is, in his review of experiments with inclusion blennorrhea on monkeys (baboons and rhesus) there were twenty-nine positive results and but one negative—a far higher percentage of successful results than can be shown in experimental trachoma.

Botteri also demonstrated the filterability of the inclusion virus in one of the two baboons inoculated. Histological examination of the follicle formation on the conjunctiva of the baboon which served for the filterability test showed its complete resemblance to that found in trachoma.

The question of the identity of the inclusion bodies found in the two diseases has been sharply contested. The proponents of the identity theory base their opinion in part on the mutual, although temporary, immunity each disease provides against the other; the opposition, on the other hand, believe it just as likely that the inclusion virus may be a mixed infection to which the immunizing effect can be attributed, instead of to trachoma.

Summary

1. In a series of twelve cases of ophthalmia neonatorum, two were gonorrheal blennorrheas, six were silver nitrate blennorrheas, and four represented what is known as inclusion blennorrhea.

2. Material from the eye of such a case was inoculated into the scarified conjunctiva of a macacus rhesus and a reaction resembling inclusion blennorrhea of the newborn developed, although no epithelial-cell inclusions were found in the conjunctival scrapings.

3. There is a distinct type of conjunctivitis affecting principally the newborn, which ultimately heals without scarring. It is characterized by a much later onset than occurs in gonorrheal blennorrhea, and by the presence of follicles and of inclusion bodies. This disease may be transmitted by contact.

4. The condition is probably more common than is generally stated, because suitable methods of examination have not been employed.

5. The significance of epithelial-cell inclusions is as yet purely hypothetical.

Euclid avenue and Kingshighway.

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OCULIST, OPTICIAN, AND PATIENT

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The best interests of the patients are subserved by cooperation of a thoroughly trained ophthalmologist with a competent dispensing optician. Accepting rebates and commissions is inherently unjustifiable. When such practices come to the attention of the public, as they eventually do, they rob the profession of its prestige.

In approaching the question of the relationship between oculist and optician, one is confronted by many entangling problems. He feels or is soon made to feel that he is going across a "no man's land", and finds himself at once in the line of fire of both friend and foe, and the target of any and all who may have some sort of weapon wherewith to shoot at him. The impulse is to drop into the nearest available shelter and remain quiescent. What appeared, at first, to be an almost self-evident proposition, and one that would only need to be given tangible expression in order to be accepted, is found to uncover ramifications and complications that all but becloud the issue at stake. We all wish our patients to have the best service obtainable, both for their own comfort and satisfaction, and for our own reputations and success. Just what should constitute such a service, and the factors entering into it, are the questions to be settled.

It is more or less of a truism to say that work is done by the one best fitted to do it, but when we come to interpret and apply this axiom we immediately encounter personalities. And it is this unfortunate circumstance that hinders unbiased discussion of the questions of optical service.

Few medical men would take issue with the proposition that eyes are best cared for by medical men trained in the department of ophthalmology. None of us, I am sure, would feel as competent in our work without the general medical background gained in the full medical course of instruction necessary to the degree of doctor of medicine.

Nothing can make up for this training. If it is lacking, the individual's perspective is lacking. He is short-sighted and astigmatic in his viewpoint when considering ophthalmic problems. No title of "Doctor" prefixed to a name can give this background, and no lesser course than the tedious, arduous one mapped out in our medical schools can be substituted for it. Therefore we feel that to be a competent ophthalmologist one must also have first been a competent medical man.

But the medical education alone does not necessarily qualify one to be an ophthalmologist, so some seem to think. After the general training there are months and years of work and study necessary, on the eye and its relationships alone, before the word "competent" is rightly placed before the word "ophthalmologist".

So, too, when it comes to those upon whom we rely to supplement our work with mechanical appliances, such as lenses and spectacles. No man should consider himself a master mechanic until he has served his apprenticeship in the actual shop work and at the bench. An optician who has not had this fundamental training will not be able to note, or appreciate, the fine mechanical points that go to make a finished piece of work. That is why we see so many clumsy, ill-adjusted frames and mountings; why there are so many unfinished screws, and so many loose lenses caused by improper mounting; also why the doctors are so often censured because of the poor mechanical quality of the work foisted upon their patients. A competent optician is just as much the product of arduous training as is the oculist, and there are too many in each class who have failed to spend the proper amount of time in preparation.

But, assuming that there is at least one of each class in any certain locality, it would seem logical that the interests of the patient would best be served by these two getting together and upholding each other's hands. In many cities

there are competent oculists who are not satisfied with their present dispensing methods, and in those same cities are opticians who would welcome the cooperation of an upright medical man to whom they could refer their refractions and know that they would be cared for adequately and returned for proper dispensing service. Many an optician is doing refracting because he either distrusts the honesty of the nearby oculists, or because he feels that he, himself, can do as good or better work than that coming from them. Too often the ability of an oculist is judged by the character of the glasses and mountings which he gives his patients. By that I mean the manner in which the frame is adjusted and the way in which the mechanical fitting of the lenses to it is carried out. No one is better able to judge of this than a skilled optician.

It is a point of honor for an oculist to insist on seeing a patient's glasses after the prescription is filled, and checking them over to see that the prescription has been filled accurately. Few are the oculists indeed who do not make this their avowed practice. Yet how many of them know a good job when it is presented to them?

The checking of lenses with a Geneva lensometer is still altogether too common a practice, and the checking of the cylinder axis by crossed lines and a protractor still leaves some doubt as to its accuracy. Furthermore, in these days of vertex refraction, the neutralization of lenses (especially in the higher curves) is not by any means a check on values.

Because of these facts, and because oculists are either careless about them or are ignorant of their importance, poor work is sent out wholesale, and patients have inferior work given to them, when they have paid, and paid well, to have what they have been led to expect is the best.

It is useless to prate about accuracy in refraction if we permit our prescriptions to be filled carelessly. And we do so permit it if we still hold to antiquated methods of checking the lenses, or do not insist upon accuracy and refinement in the finished product.

It would be ideal to see a thoroughly competent oculist attending to the medical, surgical, and refraction needs of his patients, and an honest, capable optician-mechanic supplementing his efforts with skilled work in making, mounting and adjusting the lenses called for by the doctor's prescriptions. Such an ideal has been arrived at here and there throughout the country. But it cannot be maintained if either party plays false in any way with the other.

If a rebating optician enters such a field he should be rigidly shunned by every honest ophthalmologist. For in so far as he is patronized, by just so far is his policy endorsed, and the optician himself will be the first to recognize that fact and capitalize it. Furthermore, every doctor that patronizes an optical house that is known to be giving rebates is under the ugly suspicion that he is doing so for what he can get out of it. Other opticians either look upon him as one who accepts rebates, or pity him for a fool because he does not. The outside optical world is frankly suspicious of such a man, and by just so much is his influence in his community lessened. Whether or not the policy of shunning a rebating optician could be turned about and applied to doctors patronizing such opticians is a matter for consideration. Possibly, if ethical dispensing opticians shunned the doctors who send their work to rebating firms, the evil of the practice might suddenly stand out more clearly.

To some this matter of taking rebates seems a perfectly proper means to increase their incomes. Such men are hard to convince of the fundamental evil inherent in the practice. Not so, however, their patients. If they feel that the oculist is getting an extra profit over and above the considerable fee charged for refraction, they are at once indignant; and in all probability will go to some other doctor when next their eyes are in need of attention. The patients certainly are alive to the iniquity of rebating, even if the doctor is not. In some states notice has been

taken publicly of this evil, and laws passed to make it a misdemeanor. All of our national medical societies condemn the practice, some more severely than others; officially, at least, rebates and commissions are tabooed by all. So it seems hardly in keeping with the spirit of the times to find men upholding and defending their practice in the taking of favors, or commissions, for work that they have already charged a substantial fee for. Nor is it fair to the patient to refuse to take a rebate or commission on his glasses, and yet to allow the optician or firm to bestow gifts on hospitals, or on charitable organizations, in the doctor's name. This is such a patent subterfuge that it should hardly need discussion, yet it is a practice that is not rare, and is defended by those who would refuse a rebate in grosser form.

There may be localities in which it is necessary for an oculist to do his own dispensing; in such circumstances no one can logically find fault with him if he takes the retail profit on the glasses to compensate him for his time and trouble. But to order glasses from a wholesale house and deliver them to his patients, when the possibility exists to cooperate with a good optician, is surely begging the question for the sake of profit.

Often, however, it is impossible to cooperate with the local optician, either because of the policy under which he conducts his business, or because of the character of his work. If the optician refracts, it is hardly consistent with good business to send patients to him and build up for him a list of customers which he can later circularize to his own profit and the doctor's loss. If the optician bids for business by offering rebates, commissions, or other favors the oculist cannot patronize him on that basis without offense to his own best ideals. And if his work is not up to standard, the doctor certainly cannot accept it and continue to deal honestly with his patients.

But in most localities there exists some optician who would gladly enter the dispensing field exclusively, provided he were assured of the continuing support of one or two competent eye physicians. And it is just here, paradoxical as it may seem, that the whole question is held up.

Seemingly neither side quite trusts the honesty and good faith of the other. When the optician renounces all refracting, the oculist professes to see a deep-laid plot to get the names and addresses of his patients so that later they may be used by the "renegade" optician to build up a refracting business. When the oculist offers to support the optician, provided he gives up refracting, the latter weighs the loss of his refracting business against the chance of fickleness on the part of the doctor. Both sides can point to concrete instances to support their suspicions. But if we as oculists would lay aside our professional sanctity, and accept the well qualified and conscientious optician as a coworker, as one who in his own field is just as worthy of respect and consideration as we feel we are in ours, it would go far toward building up a better understanding and a feeling of mutual reliance that would allay all these ugly suspicions.

It is certain that in the localities where such an understanding has been brought about, the ethical standards are on a higher plane, and the optometric problem has been definitely minimized.

This question can never be settled by controversy and strife, but the victory will go to the side which does the best work and gives the best satisfaction to the greatest number of patients. Such service can best be given by thoroughly competent, medically trained refractionists, coupled with well trained, honest and tactful opticians with whom they can cooperate for the good of the patient. Let us make no mistake. However distasteful or elementary it may seem, an oculist's refraction work is the backbone of his practice; and he should qualify himself in this field as thoroughly or more thoroughly than in any other, and zealously guard the manner in which his work is supplemented by the opticians.

720 First Trust building

SOCIETY PROCEEDINGS

Edited by Dr. Lawrence T. Post

MEMPHIS SOCIETY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

May 13, 1930

Dr. D. H. Anthony presiding

Optic nerve tumor (?)

Dr. Stanford presented Mrs. Clara W., fifty-one years old, who noticed about a year ago that her right eye did not move so freely as the left. She also complained of occasional diplopia. The right eye showed a marked exophthalmos and had practically no motility. When the globe was grasped through the lids by the fingers it felt quite rigid as if it were firmly fixed posteriorly. X-ray examination showed an area of increased density in the right orbit which was rather circular in shape in the anteroposterior view. The vision of the right eye was 20/70 improved to 20/40, and the left eye 20/70 plus, improved to 20/20. The fundi were negative. Dr. Stanford was of the opinion that Mrs. W. had a large tumor of the optic nerve.

Discussion. Dr. Ellett concurred in Dr. Stanford's opinion regarding the cause of this condition, and thought the method of approach was preferably through the external rectus without doing a Krönlein operation. Tumors of the optic nerve as a rule were nonmalignant.

Dr. Stanford thought the tumor might involve the optic foramen because of the immobility of the globe.

Conjunctival flap for fistula of cornea

Dr. D. H. Anthony presented B. T. F., colored, male, aged twenty-one years, whom he first saw June 2, 1926, with the following history: right eye sore with profuse discharge for seven weeks; left eye very red and painful three weeks. Vision was hand movement at one foot with each eye. A smear was taken from both eyes and found to contain gonococci.

The right eye showed profuse discharge and a perforated ulcer in the center of the cornea. The left eye showed profuse discharge with central perforation and prolapsed iris. The patient was given two percent mercurochrome solution until he could be admitted to Memphis Isolation Hospital, where he was hospitalized for three weeks. The right eye developed chronic iridocyclitis, became entirely blind, and was removed with glass ball implantation in 1927. In the left eye the patient developed a central staphyloma of the cornea in the region of the old perforated ulcer.

About three months ago the patient contracted an acute conjunctivitis in the left eye and developed purulent infection of the meibomian glands. The patient was placed on massage of the meibomian glands twice a week, one percent silver nitrate solution and one-fourth zinc sulphate solution to get the area surgically clean.

Two months ago the thin staphylomatous cornea ruptured and there existed a fistula which persisted. The left eye was then cocainized with four per cent cocaine and the edge of the fistula curetted, with removal of a small central part of the staphyloma. A conjunctival flap was dissected loose from below, drawn upward, and placed over the corneal fistula and allowed to remain so for one week, at the end of which time the patient had an anterior chamber.

Ophthalmoscopic examination showed media clear, details of fundus seen clearly. Tension was normal to finger test. Cornea was not regular enough to take tension with tonometer. Vision was 20/40, unimproved with glasses.

Operative treatment of epiphora

Dr E. C. Ellett reported Miss B., aged forty years, who was troubled

with epiphora not relieved by Bowman's operation. The lower lids were everted and the slit canaliculi were well away from the ball. A backward cut at the site of each punctum, carried well down on the inside of the lid, brought the drainage apparatus in contact with the ball and completely relieved the epiphora.

Trephine operation in chronic glaucoma

DR. E. C. ELLETT reported Mrs. S., aged forty-two years, who was first seen in 1925. The left eye saw moving objects and the history as regards this eye was vague. It had been sore and the vision had been poor for several months. The cornea was opaque except for a peripheral rim that was clear. There were some vessels in the cornea and the tension was normal. This eye had not materially changed and its removal had been advised because it was painful at times.

There was a history of several attacks of inflammation and poor vision in the right eye for the last fifteen years. The only definite thing in the history was obtained from a physician who saw her in 1923 with chronic inflammatory glaucoma. The tension in the right eye was 95 (McLean) so operation was advised. She had had her tonsils removed for recurrent sore throat and had had much dental work done. The right eye showed some peripheral corneal opacities, like scars of sclerosing keratitis, cloudiness of the whole cornea, faint reflex, pupil 3 mm. and fixed, and tension plus one. After using eserine two days the tension was 26 (Schiøtz) and vision 15/50. The field was less than ten degrees in every direction. She received eserine, massage, dionin, and tuberculin and did very well until November, when the tension rose to 60 (Schiøtz). In January, 1926, a corneoscleral trephining with a peripheral iridectomy was done, the peripheral iridectomy being dictated by the small field.

In November, 1929, the tension was 22 (Schiøtz), the vision 15/25 with glasses, and the field the same. No acute attack had occurred since the operation and there had been no treatment. There was no evidence of a filtering scar and the disk was white and cupped, as it had been since it could first be seen in May, 1925.

Chronic dacryocystitis, cataract, suturing of canaliculi

DR. E. C. ELLETT reported a man aged eighty-three years who needed a cataract operation on the right eye. The tear duct on that side was obstructed and a small amount of mucopurulent secretion could be washed from the sac about every other day. Cultures show a gram-negative bacillus, morphologically Morax-Axenfeld. The smear showed some pus and epithelial cells and a diplococcus. Nothing could be expressed from the sac. Both canaliculi were ligated by sutures through the lids and tied, after filling the sac with mercurochrome. The cataract was extracted and the eye healed in a normal manner.

Acute glaucoma, iridectomy, cataract extraction

DR. ELLETT reported Mrs. S., aged fifty-five years, who was seen June 15, 1927, with acute glaucoma of five days duration in the right eye. The tension was 83 (Schiøtz). An iridectomy was done, but, on account of the glaucosan dilatation of the pupil, it was difficult to grasp the iris and the iridectomy was not surgically perfect. The eye, however, recovered normal vision and there was a good coloboma. In April, 1928, she had a similar attack in the left eye which was relieved by eserine. A trephining with complete iridectomy was done on May 4, 1928. Recovery was satisfactory. The myopia, which had been about two diopters, increased, and the lens gradually clouded. In July, 1928, vision was 20/25 and 20/40 with glasses. In May, 1929, it was 20/40 and 20/100 with glasses. The left lens was removed (in the capsule) at the patient's request, since the eye was eight diopters myopic and the 20/40 vision on the test card did not mean half vision from a practical point o

view. In January, 1930, she had 20/20 and could read Jaeger 1 in each eye with glasses. The tension and eye grounds were normal.

Alcohol injection in treatment of squint

Dr. E. C. Ellett said that in the Annales d'Oculistique for March, 1930, G. Salvati advocated treating squint by paralyzing the too powerful muscle with an injection of absolute alcohol, and presented two not very conclusive photographs to show the result. On April 16, Dr. Ellett tried this on a girl twenty-three years of age with a divergent squint of fifteen degrees in a cataractous eye with poor projection. About 1.75 c.c. of absolute alcohol was injected along and under the external rectus muscle, after an injection of novocain. The pain and chemosis were great, and the result practically nothing. The patient had since been operated upon.

Optic neuritis

Dr. A. C. Lewis reported a case of optic neuritis seen in M. J., a woman aged fifty-five years, on February 20, 1930. She complained of severe pain in the right eye and greatly blurred vision. Vision O. D. was 10/200; O. S. 20/20. Ophthalmoscopy showed right optic disc highly inflamed.

Nasal examination showed pus, granulation tissue, and polypi completely blocking the right superior and middle meati. February 25, 1930, under local anesthesia the right middle turbinate was removed, the ethmoid cells were removed as thoroughly as possible and the sphenoid widely opened. The latter was full of pus and the ethmoids quite necrotic. On the following day she left the hospital with no pain in the eye or the head.

March 3, 1930, the optic disc appeared almost normal and vision was no longer blurred. On March tenth, the patient reported by phone that she could see as well as ever with the right eye and that her head pain had entirely disappeared.

Keratitis profunda with chronic ethmoiditis

Dr. A. C. Lewis reported a case of keratitis profunda in a fifty-seven-year-old man who, on February 18, 1930, came with the history of pain in the left eye and dimness of vision for about one week. He had been examined in a clinic recently and reported all right. He had no teeth or tonsils, the Wassermann reaction was negative, but his urine showed a trace of albumin and a few fine granular and hyaline casts.

Examination of the eye showed the cornea to be cloudy in the upper half, a small deposit on Descemet's membrane and a mild circumcorneal injection. Nasal examination and sinus transillumination were negative. Under local treatment of atropin, dionin, and hot applications the eye became more comfortable but the keratitis increased. The whole cornea showed infiltration, and numerous small areas of yellowish deposits were scattered throughout the corneal stroma. There was no break in the epithelial coat.

On March fourth, the x-ray laboratory reported a probable infection in his left ethmoid cells. March 6, 1930, under local anesthesia his left ethmoids, sphenoid and antrum were opened. Some of the ethmoids showed softening but no pus at that time. Since then there had been a scanty mucopurulent discharge from the ethmoid region.

For three weeks following the nasal operation the eye showed no improvement. The whole cornea was cloudy and the opacities became larger and more numerous. A diagnosis of ocular tuberculosis was reached and tuberculin treatment was about to be instituted when he began to improve. By May 13, 1930, he had improved very rapidly, there was no ciliary injection, all the larger opacities had disappeared, and the cloudiness was rapidly subsiding.

Traumatic pulsating exophthalmos

Dr. A. C. Lewis reported a case of traumatic pulsating exophthalmos. On January 3, 1930, Mr. T., aged forty-seven years, was in an automobile acci-

dent, in which he was rendered unconscious and remained so for eight or ten hours. The x-ray laboratory reported a fracture of the outer plate of the right parietal bone, but no fracture of the base of the skull.

January twelfth, the left eye showed an internal strabismus of twenty-five or thirty degrees and a paralysis of the left externus muscle. Vision and fields were apparently normal, and the pupil reacted normally to light. Ophthalmoscopic examination was entirely negative, no changes being found in the media, disc, retina, or vessels. With the exception of the squint and the blurred vision, there were no objective or subjective ocular symptoms.

On January seventeenth, the patient was again seen at home. The left eye showed slight exophthalmos and slight congestion of the bulbar conjunctiva, but no pulsation or bruit was found about the eye and no intraocular changes or reduction in vision.

On January eighteenth there was marked ptosis, chemosis, exophthalmos (about 15 mm.), marked dilatation of the angular and nasofrontal veins and veins of the upper lid. Strong pulsation was felt on palpation of the globe. A loud bruit was heard over his eye and was audible all over the cranium. The patient complained of a loud, pounding noise in his head and marked reduction in vision of the left eye. The ophthalmoscope showed the retinal veins to be dilated and optic disc to be congested but no papillitis. A diagnosis of arteriovenous aneurism was made. During the three following days digital compression of the left common carotid was employed at frequent intervals to test out and improve the collateral and compensatory circulation. This would cause the bruit to stop promptly and produce no numbness of right arm and leg.

On January twenty-first all symptoms increased, both subjective and objective; no light perception remained in this eye. The patient was taken to the operating room, where, under local anesthesia, Dr. Semmes ligated the left internal carotid artery. Before ligating the vessel, a clamp was used on it for thirty minutes to test the safety of the procedure. During this period no numbness, anesthesia, or paresis appeared on the opposite side, and the bruit was evidently controlled. Since that time he had been kept quietly in bed and had made a gradual improvement.

On February eleventh, external examination showed the exophthalmos to have receded about one-half and no pulsation or bruit was present, but there was still a large ridge of chemosis extending across the globe below the cornea. No light perception was present. The optic disc appeared quite normal, the retinal arteries were very small and the veins were slightly dilated.

R. O. RYCHENER,
Secretary.

MEMPHIS SOCIETY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

June 10, 1930

DR. J. B. BLUE presiding

Toxic conjunctivitis

DR. R. O. RYCHENER presented Mr. J.M., aged twenty-four years, who was recovering from acute conjunctivitis and dermatitis medicamentosa. Five days before, he had consulted a general practitioner for a local irritation on the forehead and lids and was given a chrysarobin ointment to apply locally. Within an hour after application there was intense suffering because of photophobia, lacrimation and marked swelling of the conjunctiva. The lids presented the red, dry, swollen appearance of erysipelas, while the entire conjunctiva was chemotic and the lower portions of the cornea stained superficially. Under butyn ointment to the conjunctiva, iced applications, zinc, and ammoniated mercury ointment to the lids, he made a comfortable recovery.

Discussion. DR. SHEA had seen this boy at the very onset of his discomfort and said the lids looked like the reaction seen after an overdose of ultra-violet rays.

DR. STANFORD thought toxic conjunctivitis to be quite common after atropin or eserine medication, and thought it called for bland treatment and a substitution of an analogous drug.

DR. ELLETT called attention to the prevalence of hypersensitivity of some patients to certain drugs, especially butyn. He believed that where drugs such as atropin, eserin, etc., were used over a long period of time, the conjunctivitis and dermatitis were probably due to an infection of the conjunctiva or skin from a dirty or contaminated solution of the drug. But he had seen patients in whom the first drop of butyn solution was sufficient to cause an intense inflammation.

DR. P. M. LEWIS corroborated this observation and reported a case of glaucoma seen at frequent intervals in which one drop of butyn was sufficient to cause intense swelling of the entire face, and to induce real suffering.

DR. RYCHENER thought it worth while to mention that the chief action of chrysarobin was that of a mucous membrane irritant, and to remember its toxicity for the conjunctiva.

Pedicle skin graft after cartilage graft in repair of lower orbital margin

DR. R. O. RYCHENER presented Miss T.B., aged nineteen years, who had suffered the loss of the right lower orbital margin following trauma as an infant. He had shown the patient a year previously following release of cicatricial ectropion of the lower lid. Since this time three cartilage grafts from the sixth and seventh costal cartilages had been inserted to build up the lower orbital rim, after which Dr. J. D. Cleveland had placed a pedicle graft from the right arm over the remaining defect. A striking cosmetic improvement was apparent.

Discussion. DR. LOUIS LEVY complimented Drs. Rychener and Cleveland on the splendid result achieved as he had followed the case from the beginning and the change was really remarkable.

DR. D. H. ANTHONY thought the implantation of the cartilage graft had done very well as it paved the way for the pedicle placing.

DR. RYCHENER gave all credit for the end result to the splendid workmanship of Dr. Cleveland.

Bilateral exophthalmos

DR. D. H. ANTHONY presented C.E.S., male, white, aged forty-eight years. The patient thought that both of his eyes were slightly more prominent than the average, but he experienced no trouble until fourteen months ago he noticed that both eyes began to protrude. Both eyes continued prominent and during the past three months felt very full and pained when he read.

Examination showed right eye vision 20/25; with a plus 1.50 cyl. ax. 90°, 20/20. There was a large pterygium on the nasal side. Eye movements were normal in all directions. Fundus was normal. Exophthalmometer reading was 25 mm.

Left eye vision was 20/25; with a plus 0.50 cyl. ax. 180°, 20/25 plus. Fundus was normal. Eye movements were normal in all directions. Exophthalmometer reading was 27 mm.

The patient felt physically perfect, his blood pressure was 110/70 and general examination, including blood, urine and metabolic rate, was entirely normal.

Discussion. DR. R. O. RYCHENER had seen this patient a year previously with the same complaint, at which time the vision was normal and the exophthalmometer reading was O. D. 21, O. S. 23. There had been a definite increase in the exophthalmos during the interval, but there was no difficulty in covering the globe with the lids. There were no demonstrable eye signs of exophthalmic goiter, and he was inclined to believe the proptosis due to an hypertrophy of orbital fat.

Traumatic cataract

DR. D. H. ANTHONY presented W. McC., a white boy, aged fifteen years, who had never had any eye trouble before the accident to his right eye and was sure he had read with either eye. He was struck in the right eye two and

one-half years ago by a piece of coal. Vision failed badly in this eye and he noticed about three months later he could not see to read with it. Vision was normal in the left eye for distance and near. The right eye showed a slight divergent squint; movements normal. Ophthalmoscopic examination showed very faint fundus reflex at the inferior temporal region of pupil, whole lens opaque, more marked on nasal and superior three-fourths of lens. With corneal microscope there appeared to be no rupture of the anterior capsule of lens. Tension O.D. 28; O.S. 24 Schiøtz. The left eye was normal.

Discussion. DR. RYCHENER cited a case of penetrating injury due to a fragment of coal which the x-ray did not manifest, but which proved to be present following enucleation.

DR. J. B. STANFORD remarked that penetrating injury was not necessary in the production of traumatic cataract and spoke of boxers who developed cataract following trauma.

DR. RYCHENER had seen four such eyes in boxers as Dr. Stanford had cited, but in each the cataract was secondary to detachment of the retina induced by the trauma.

DR. ANTHONY had advised against operation because of the possibility of visual confusion due to the anisometropia.

Central retinal or choroidal hemorrhage

DR. P. M. LEWIS presented a patient showing a central retinal hemorrhage of traumatic origin. J. W., white male, aged twelve years, was struck in the right eye with a clod of dirt on June 1, 1930. He had some pain for a short while which soon subsided. Vision was practically lost, but by the following day he could see a little, so nothing was done about the injury, it being considered a very trivial matter. Two days later his mother noticed that the eye was very red and the boy could scarcely see at all. He was first observed by Dr. Lewis on June fourth, the third day after the accident.

Examination showed the cornea very cloudy and the anterior chamber filled with dark blood. Vision was reduced to perception of light. He was immediately hospitalized and kept quiet in bed. Hot compresses, atropin and dionin were used locally. In two days the hyphema had absorbed and the cornea was fairly clear. The vitreous was still very hazy so that no fundus details were discernible. On June seventh, the sixth day after the injury, he had another hemorrhage into the anterior chamber, this being the second time hemorrhage had occurred. On the following day the blood had absorbed and the vitreous had cleared so that the fundus could be examined. A large dark area of hemorrhage was seen extending from the disc outwards over the macular region. The temporal portion had a grayish color and a striped appearance. Small retinal vessels could be seen anterior to the hemorrhage. Vision was the counting of fingers at three feet. The scotoma had not yet been plotted.

Discussion. DR. STANFORD thought the hemorrhage was from the choroid as he saw a rent in the retina. He had stopped using atropin in cases of hyphema as he felt that he had induced glaucoma in two such cases. Since using eserine he had had no trouble.

DR. P. M. LEWIS thought it looked like choroidal rupture at this time, as the hemorrhage had been sufficient to obscure the details now visible.

R. O. RYCHENER,
Secretary.

CHICAGO OPHTHALMOLOGICAL SOCIETY

May 19, 1930

DR. CHARLES G. DARLING, president

Macular change

DR. C. DEVNEY presented a woman, fifty years of age, who had come to the Billings Memorial Hospital about a month previously. There was a history of a spot in the left central field of vision, present since December, 1929. An oculist had told the patient that there was a hemorrhage in the left macular region for which he could not

do anything, and advised a general examination which was negative except for a slightly elevated blood pressure.

On examination there was found a one-fourth disc diameter hole in the left macular region, a punched-out area surrounded by a gray edematous area with no pigmentation and three white spots in the floor of the lesion. She was referred to the medical clinic, where it was found that her husband had died of general paresis two years earlier. Previous Wassermann tests had been negative, but two consecutive tests made at the hospital showed a blood Wassermann of 4 plus. This, together with a left central scotoma, was the only positive finding. She had a vasomotor rhinitis for which she was under treatment. Vision, R.E. 12/10; L.E. 4/10—2, eccentric vision with correcting lens.

Blind pension law

Dr. William H. Wilder, vice President of the Illinois Society for the Prevention of Blindness, and Audrey M. Hayden, the executive secretary, presented a report on the working of the law pertaining to pensions for the blind as at present administered in the State of Illinois.

The closure of the cataract incision

Dr. Samuel G. Higgins read a paper on this subject.

Discussion. Dr. W. A. Fisher was glad to hear Dr. Higgins discuss the conjunctival suture, because it was very important in the healing process after cataract operation by any method. A point that should be emphasized is that a conjunctival suture, if used, should be tied with forceps instead of with the fingers. With no vitreous loss and no tag of capsule or iris in the wound healing should occur within a few days.

The preparation of the eye was important. The pupil should be dilated with something that would not hold it open—homatropin or euphthalmin rather than atropin—because it was desirable to have the pupil contract after the lens was born. He believed it best not to decide what kind of operation was to be done until the incision was made; if the pupil was smaller than the erisiphake or there was blood in the anterior chamber that could not be removed, he would not do the Barraquer operation or capsule forceps operation, but rather the Smith operation, because if one were not an expert he might dislocate the lens with the erisiphake or capsule forceps more often than by the Smith method.

Any good operator could do any cataract operation as well as he could do the capsular operation. The intracapsular operation was more difficult than the capsulotomy, but that should not deter good operators. The Barraquer operation and capsule forceps method were more difficult than the Smith operation, but if properly performed, any method of removing the lens in capsule offered better results than the capsulotomy operation, and the healing process was better after the intracapsular operation. When complications occurred while performing the Barraquer or capsule forceps operations the Smith technique was very important. Colonel Smith's wonderful teaching had been a great help, though many, including the speaker, preferred to use his technique adding akinesis, superior rectus suture, conjunctival suture, omitting iridectomy and substituting peripheral iridectomy, leaving a round pupil.

Dr. Harry Gradle congratulated Dr. Higgins on bringing together the literature on corneal and conjunctival suture for closing cataract incision wounds. One point had not been stressed. Probably the greatest advance in cataract surgery in the past hundred years was due to limbal incision and conjunctival flap. This was true in spite of the intracapsular method, which was still somewhat experimental despite the enormous experience of Smith, Barraquer and others. Very few followed the dictum laid down by Graefe who said there should be no eye opened through the cornea without a conjunctival flap and incision at the limbus. Otherwise, one was dealing with tissue that had no active nourishment, and with tissue that

would not approximate as smoothly as other tissue. The Kalt suture did not permit incision at the limbus or under an operative flap. Any incision in the eyeball, whether it was for extraction of cataract, for iridectomy, for needling or for anything else, should be at least at the limbus and should have a conjunctival flap. That was the objection to the Kalt suture.

Dr. O. B. Nugent said that while the operation might be properly done and the incision properly made, if there was a leakage of the wound following, that would allow prolapse of the iris, thus delaying the healing. The lids, therefore, were a great support, and should be more securely fastened than solely by a bandage. Sewing them together was a very simple procedure; one per cent novocain injected in the lid where the suture was to be placed obviated pain, the suture being put in after the manner of a mattress suture and tied after operation.

Dr. Wm. H. Wilder asked Dr. Higgins if the refractive condition of the eyes in his series was changed by more marked astigmatism after placing such corneal sutures. This should be carefully considered. Theoretically, one would feel that there was too much irritation to the cornea in subjecting it to such a wound. Had there been any evidence of trauma to Descemet's membrane, which, one would think, might occur in forcing a needle through that delicate tissue?

Dr. Ramon Castroviejo said that Dr. Higgins evidently sought to demonstrate the advantage of the corneal suture over any other type of suture to be used after cataract extraction. This offered several points for discussion; the first, that with the conjunctival suture one could secure the exposure of the lens and an open field for operation just as well as with the corneal suture. Another point in favor of the conjunctival suture was the easier technique. When a complication arose which threatened a loss of vitreous, extreme alertness and painstaking accuracy were required in closing the corneal suture. The danger of rupturing the thin layers of the cornea was great. This was somewhat overcome in the use of the conjunctival suture, which was simpler and had a firmer base. Furthermore, the corneal suture was a foreign body and acted as an irritant to the eye more than did the conjunctival suture. The latter was less apt to cause corneal infection, being located further from the limbus. As Dr. Gradle said, we knew that due to the scarcity of blood vessels in the cornea it was not the best structure for the incision, as the lesser circulation was not conducive to early cicatrization. There was also danger of penetration into the anterior chamber, and several cases had been reported where this had occurred.

Dr. S. M. Edison remarked that while Dr. Higgins had mentioned nearly every type of conjunctival flap, he failed to mention the so-called Wolff flap. Two diverging diagonal incisions are made through the conjunctiva from eleven and one o'clock, respectively, beginning at the limbus, dissecting a very thin conjunctival flap sufficient to cover about four-fifths of the cornea. A suture is placed at either corner of the flap from above downward, then a bite is taken through the episcleral tissue at about four and eight o'clock, and a double loose knot tied in the sutures. The flap and sutures are then placed out of the field of operation and in emergency could be placed and tied instantly. The advantages of this flap are: the sutures are placed and ready to be tied before entering the globe; in an emergency the flap is drawn over the incision and the sutures tied almost instantly without touching the globe; if the flap is thin enough it permits inspection of the subjacent parts and reformation of the anterior chamber; it prevents escape of vitreous during and after operation; when the sutures are cut the flap retracts in a few days to its normal position.

Dr. Samuel G. Higgins (closing) said that they were not talking about how the wound heals except for the influence that some form of closure would have. He thought it was better to put a stitch

in place before the incision was made. Another point was that you have in the cornea a rather fixed curve. The cornea falls down in one place and if given any chance it stays in position. There was less exudate when the edges of the wound were nicely approximated by the mattress suture described. He had not observed that the entrance of the needle into the cornea had produced astigmatism. The cornea accepted the sterile black silk thread with little or no irritation. Often one had to use the loop to tell where the thread passed. There was more scarring when the thread was passed through the superficial layers or if the cornea was scratched or pricked in the attempt to insert the needle. The curve of the needle prevented the point entering the anterior chamber. The corneal threads could be firmly grasped by fixation forceps without teeth when one wished to raise the cornea. This procedure facilitated the placing of the erisiphake and also the making of the peripheral iridectomy in an open field.

The synergistic action of atropin and adrenalin on the intrinsic muscles of the eye

Drs. Hallie Hartgraves and Peter C. Kronfeld said that adrenalin, cocain and ephedrin dilated the pupil by causing an active relaxation of the sphincter muscle of the iris and a stimulation of the dilator, while atropin and scopolamin acted by paralyzing the sphincter. The combined action of the drugs of these two groups on the pupil was known as one of the best examples of synergistic action in ophthalmology. In all the cases of the authors' series the pupil could be still further increased in size by the use of cocain or adrenalin after complete atropin mydriasis.

The changes of refraction as found by retinoscopy after complete atropinization followed by cocain or adrenalin were found to lie within the limits of error. In four cases the refraction was taken first under adrenalin and later under atropin. In these cases the refraction under adrenalin was practically the same as that found by ordinary manifest refraction. It was concluded that adrenalin had no influence on the tonicity of the ciliary muscle, although the range of accommodation was considerably reduced; adrenalin prevented, or in small doses reduced the contractility of the ciliary muscle, but did not change its original natural tone.

The frequency of astigmatism

Drs. P. C. Kronfeld and C. E. Devney, in reporting on their work on astigmatism, said that for the first time the frequency of total astigmatism had been studied, that is, every eye was refracted under atropin cycloplegia. Only astigmatisms of 0.50 to 6.00 diopters were considered, and they were grouped so that each group had a width of 0.75 diopter. In other words, group one consisted of 0.50, 0.75, and 1.00 diopters. The spheres considered ranged from plus 8.00 to minus 6.00 diopters and were similarly grouped.

The authors found that the curve of frequency for group one was on a fairly constant level between the refractions of plus 3.00 D. and minus 5.00 D., but that the frequency was less toward the hyperopic and myopic ends. They felt that this curve corresponded to the physiological astigmatic group and that above one diopter of astigmatism (Donders' upper limit of physiological astigmatism) the character of the curves for each group changed so that the minimum frequencies fell on plus 1.25, which (according to Brown and Kronfeld) was the most common refraction. In the latter groups, the higher frequencies lay on the hyperopic side. Consequently a hyperopic eye of a certain degree was more likely to have a higher grade of astigmatism than a myopic eye of the same degree, and the more a refraction differed from plus 1.25 D., the more likely there was to be an astigmatism.

In group one they found a great increase in the frequency of astigmatism in the refractive group minus 2.25 D. to minus 2.75 D. This great increase was explained by the fact that it corresponded to the so-called school myopia or "growth myopia" group when un-

balanced states were more common. The authors hoped to increase their data and eventually explain this rise more satisfactorily.

Discussion. Dr. E. V. L. Brown said that current views concerning the incidence, cause, nature and behavior of hyperopia and myopia were now being widely challenged. The hyperopic eye was spoken of as being too short from before backward, and the myopic eye as being too long. Tron in a recent article contended that the hyperopic eye measured between 19 and 24 mm., about as held heretofore, but that the emmetropic eye might also be as short as 20.46 mm. or as long as 25.46 mm., and, what was more at variance with previous views, the myopic eye might be less than 22 mm. in length. In these short eyes the myopia was determined by a very sharp curve of the surfaces of the cornea, or lens, or both. Secondly, it was widely held that the development of myopia was favored by close work, position of the head, etc., and many oculists turned eagerly to the second article by Levinsohn in 1928 on the experimental production of myopia in monkeys, but were not convinced by the data.

Two colleagues carried out experiments on monkeys in Java, and sent the eyes to Levinsohn in Berlin for anatomical study. The head and eyes of the animals were held in horizontal position for six to sixteen months. Ten monkeys were used, three for control and seven for the mechanical production of myopia, and this latter condition developed in five of the seven. The change in refraction was from a hyperopia of two to a myopia of one to two diopters; a temporal conus developed in four animals and in one or more eyes this occurred within a span of four months. The eight eyes of four monkeys in whom myopia had developed and one pair of eyes from a control animal were studied anatomically. The two eyes of each animal were practically alike, and in general the experimental eyes showed the changes often found in human myopic eyes, namely: (1) an obliquity of the sclera just temporal to the disc, retraction of the adjoining lamina elastica and pigment epithelium, and atrophy up to complete disappearance of a corresponding temporal crescent of the choroid; (2) marked nicking of the nerve fiber layers back into an angle behind the somewhat forebulging and retracted end of the lamina elastica; (3) supertraction of the lamina elastica and pigment epithelium nasally; and (4) forward displacement of the temporal side of the lamina cribrosa.

This work of Levinsohn's was the most solid material of any produced by the advocates of any mechanical, as opposed to hereditary, theory of the production of myopia, but it could be criticized. First, the determination of the original state of refraction and the final myopization was probably done by the inexact method of ophthalmoscopy, because no reference was made to cycloplegia or retinoscopy. Second, the changes in refraction produced were relatively small, i.e., three to four diopters. Third, a temporal conus was found in many emmetropic and hypermetropic eyes clinically, and sometimes anatomically, as in a case in a 24 mm. bulb reported by the speaker (Brown). Fourth, one out of every six monkeys was myopic. Fifth, the material was too small, consisting as it did of the eyes of only four monkeys.

Adequate experimental and clinical evidence, therefore, that myopia could be produced by position of the head or eyes was still lacking.

It was commonly thought that myopia was much more prevalent in Europe than in America, but Scheerer's statistics of occurrence seemed to be as reliable as any, and he placed the average refractive error in a large European out-patient clinic at one-half diopter of hyperopia, while Drs. Kronfeld and Brown had found it at one diopter in the atropinized eyes of 10,000 individuals seen in Chicago. Such a small difference would not justify the conclusion that there was in reality any difference at all in the amount of nearsightedness in Europe and the United States. It might of course well

be that there were more cases of extreme myopia and hyperopia in Europe than in America, and the average might be the same in each area. Many more refraction data, therefore, were needed, and such studies as these presented from local material concerning the incidence of astigmatism were very welcome.

DR. P. C. KRONFELD said that it was necessary to be cautious in expressing opinions about refraction. The point which Dr. Brown emphasized was that all comparisons must be based upon large numbers of cases. The material must be obtained under similar conditions, that is, under the influence of an atropin cycloplegic.

DR. WM. H. WILDER congratulated the workers upon the accomplishment of the tremendous amount of work represented by these papers. It was hard to say, however, what the practical value of such a series would be, or how any logical practical conclusions could be drawn from them. It was well known, as shown by Dr. Risley and the observations of others, that the refraction of the eye as well as the astigmatism was likely to change with changing general conditions of the body. Dr. Risley noted the interesting fact that in many individuals in adolescence, compound hyperopic astigmatism changed through the turnstile of simple hyperopic astigmatism, mixed astigmatism and simple myopic astigmatism into a compound myopic astigmatism, an observation confirmed also by other careful clinicians. It would, therefore, seem that to make any statistics on the subject of refraction of any particular value we should take into consideration a number of important factors such as those that concern general nutrition that might bring about a lack of natural growth of the eye. While the effort was certainly most commendable, it seemed that it lacked a statement of the physical condition of the numerous patients, which might enable one to draw more logical conclusions.

DR. P. C. KRONFELD (closing) wanted to bring out one point. He did not believe that the growth of the eyeball was influenced by any condition from the outside. But if there were factors which influenced the growth of the eyeball, then it looked as if statistics would offer one way of following it. These statistics, comprising 10,000 cases, showed at least what one case would show if followed over a period of twenty years. They showed much more. Each case was examined once. By comparing this cross section with a similar series in another part of the world, where hygienic conditions were different, it should be possible to see whether these factors did influence the eye. A famous German who tried to figure out the frequency of myopia in 1895 and in 1905 was much discouraged; regardless of what was done the frequency of myopia was as high. The material must be available in order to draw any conclusions, and the only way of getting the material was by statistics.

ROBERT VON DER HEYDT

LOS ANGELES COUNTY MEDICAL SOCIETY

Eye and Ear Section

June 2, 1930

A. RAY IRVINE, president

Glaucoma

DR. JULIAN DOW stated that he found the trephining operation most satisfactory for chronic glaucoma, while iridectomy sufficed in the acute types. He asked all chronic cases to return for observation every two months following operation and acute cases every three months. At this time the fields and tension were taken and inquiries were made concerning the general health. All foci of infection were removed before operation. The criterion for operation was a diminution in the visual field or in central vision. Dr. Dow found that when cases no longer responded to miotics, if glaucosan were used they would again respond to miotics. Ten case reports were given. Eight patients were over sixty years of age. Two had hyperopia, one mixed astigmatism, and all the others were myopic.

Discussion. Dr. Clifford Walker called attention to the fact that the patient should be told not to expect any increase in field after operation. Glaucoma was a disease of the capillaries and he was optimistic concerning the future for the medical treatment of glaucoma.

Dr. Eugene Lewis stated that the vitreous should be investigated from a physicochemical basis as an etiological factor in glaucoma. The percentage of protein was so small that one must look to the crystalloids for an explanation of the increased water content or pressure. The small sodium chloride molecule was capable of exerting as much pressure as the larger protein molecule. The acid-base balance of the body might be a factor in the disturbance of the water content of the vitreous.

Dr. M. F. Weymann inquired as to the condition of the vitreous in the case reported where there was myopia of nine diopters.

Dr. Dow replied that the vitreous in this case was normal and showed no degenerative changes.

M. F. Weymann,
Secretary.

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THE FITTING OF GLASSES

The phrase "fitting glasses" comes to us from a time when the customer chose the lenses that he thought gave him the best sight, and the optician gave advice about the form of frame that suited his face and needs. That simple way of buying an optical instrument to supplement sight was popularly applied when the commonly known reasons for wearing glasses were to help the near seeing of old people and the far seeing of myopes.

After Dr. Thomas Young had called attention to astigmatism in his own eye, and when Airy had recognized how it had impaired his vision and with the help of the optician Fuller of Norwich, England, had secured a cylindrical lens that corrected it; after Goodrich with the help of McAllister of Philadelphia had done the same thing; after Helmholtz, Knapp, and their successors had shown that astigmatism was a common cause of imperfect vision; after Donders and his followers demonstrated that hyperopia was an important and common eye defect, and was a cause of strabismus, asthenopia, and headache; after Weir Mitchell, with Thompson and Norris, had demonstrated the number of cases of neurasthenia dependent on use of ametropic eyes; after nausea, anorexia, dizziness, and even epileptiform convulsions had been found arising from use of defective eyes; and when Norris, Risley, and others had shown the connection of ametropia with ocular lesions, vision and its defects assumed a very important place in pathology and etiology, a place which is rendered even more comprehensible and logical since Elliot Smith pointed out that the development of the "neopallium", the mass of the cerebral convolutions, was associated with development of accurate macular vision, with related binocular movements, and with manual dexterity.

The discovery that poor vision, ocular pain and inflammation, headache, vertigo, strabismus, and convulsions might arise from "eye-strain" did not

make them any the less symptoms of bodily disease; but did make it important that modern medicine, which is based on applications of physical science, should include the study of those symptoms, their use in diagnosis, the investigation of their causes, and the relief of disability and suffering, by application of the proper remedies. Physicians had to study enough of optics to understand and apply the remedies indicated, whether these were spherical or cylindrical lenses, prisms, contact glasses, ocular exercises necessary to establish normal neuromuscular coordinations, or changes of habits or occupation to bring effort within the limits of endurance.

The claim that opticians do not treat the eye, but treat rays of light, is sophistry as shallow and evident as ever was offered by any quack to bolster up his claims for a special medicine or formula which rendered knowledge of anatomy, physiology, or pathology of the body quite unnecessary in the cure of constipation, consumption, or cancer. If you have headache, get a pair of glasses from an optician, and forget that sinus disease, fever, bad air, worry, indigestion, or general diseases might cause it. If you have vertigo buy another pair of glasses. If your eyes get red and the lids stick together in the morning see the optician, and take his advice as to what is the latest style in frames, or the appropriate thing to wear with evening dress. If your eyes are sensitive to light let him "treat the light" with the colored glasses he sells under a copyrighted name. If you still think too much about your eyes go back to the optician and ask him for lenses that are "clear to the very edge". This is the propaganda that is spread abroad by pages of expensive advertising; and there are even doctors of medicine who are influenced by such suggestions, and are disposed by his appearances of financial prosperity to imitate the optician in his methods.

Discovery of the wide influence of difficult or defective vision on the health of the nervous system, and through it on other parts of the body, placed a responsibility on the medical profession that it has been slow to accept; and offered it an opportunity that it has somewhat neglected to use and profit by. The fact that fundamental scientific training is necessary to fit one to make a medical diagnosis or to choose the best remedy does not destroy the other fact that the accurate selection of correcting glasses requires fundamental training in optics, understanding of mathematical principles and methods, and careful discrimination as to whether or not an optical prescription has been accurately filled so as to give the patient the best practical assistance to comfortable vision that modern progress in science and the arts can afford.

When people began to understand the value of good and easy vision—how much it would contribute to health, comfort, and efficiency—a demand was created for optical service, that neither the medical profession nor the optician could then supply. The optical service requires that skilful and conscientious optical examinations be added to the resources of medical diagnosis; and that opticians devote more care and attention to the accurate grinding and placing of glasses before the eyes. Instead of preparing themselves to meet these requirements some physicians accepted profits from the extended sale of glasses; and some opticians sought the more lucrative returns of counter prescribing and patent medicine quackery, as applied to the spectacle business.

The attempt to create by legislation and advertising a new profession of "optometry" already shows that it is a failure. The widely proclaimed courses of scientific study that have been offered in a few good schools have attracted but an insignificant part of the would-be optometrists. The learned and imposing disquisitions that appear in journals of optometry on the subjects of eye movements, theory of accommodation, and eye diseases are largely bombastic and absurd, rather than scientific or professional. There

is a manifest disposition of optometrists to become sales agents for manufacturers rather than independent professional or business men. Meanwhile the need for accurate optical examinations of the eye, and for the perfect mechanical placing of glasses before the eye, continues to increase.

The existing situation is intelligently discussed by Reed in this issue of the American Journal of Ophthalmology, with constructive suggestions of continued specialization and of closer future cooperation between eye physicians and opticians. The whole matter is one for serious thought, outspoken convictions, and earnest discussion. There is no more important subject now claiming the attention of our readers in all English-speaking countries.

Edward Jackson.

THE ANGLE OF FILTRATION

The causes of so-called idiopathic glaucoma may never be fully understood; but in striving to conquer this formidable disease it is logical to attempt a complete explanation of its mechanism; while it is also not unnatural that this mechanism should be the subject of vigorous controversy.

For a long time the theory of Leber, that the iridocorneal angle and more particularly the canal of Schlemm provide for continuous drainage of the aqueous humor secreted by the ciliary body, and the passage of that fluid through the posterior and anterior chambers of the anterior segment, was accepted by the majority of ophthalmic physicians. But more recently it has been categorically opposed by a number of well known writers, including Magitot, Weiss, and Hamburger. The last named, always aggressive in the statement of his views, wrote in 1923, in the Klinische Monatsblätter für Augenheilkunde (volume 70, page 649): "Let us leave the dead in peace. The canal of Schlemm is surely not without function, but its significance and interest are no greater than those of the fifth finger or the fifth toe."

Hamburger, Weiss, and Magitot deny that there is a continuous current of aqueous humor, and consider the eye as a chamber whose variations of pressure are almost completely dependent upon the circulation of blood within the eye, while the aqueous humor is viewed as a dialyzate arising either in the ciliary processes, in the iris, or (according to Magitot) in the capillaries of the uveal tract and retina—a dialyzate whose renewal is extremely slow.

Of late years Seidel, Leber's successor, in a long series of communications, and with a great deal of energy and numerous experimental studies, has addressed himself to championing anew the contentions of the Heidelberg school.

Teulières and Beauvieux, in a detailed and well conceived discussion of this subject (Archives d'Ophtalmologie, 1930, volume 47, page 497) maintain that neither extreme of this controversy is justified, but that the truth is to be found in a combined theory. Their article is a sort of tolerant rehabilitation of the iridocorneal angle. The most important factor in ophthalmotonus, according to these essayists, is the mass of blood circulating within the eyeball. But there is a second factor which, exaggerated by Leber and his pupils, has been underestimated by the opposing school (Hamburger, Weiss, Magitot) namely that of the intraocular fluid, the aqueous humor.

Is the aqueous humor inert or does it play a part in the dynamics of ocular tension?

The broad answer given to this question is that the aqueous humor is lacking in continuity of flow; or in other words that currents do not exist, either toward the vitreous or toward the anterior chamber, when the eye is in a condition of physiological rest. Acceptable is the osmotic theory of Hamburger, Wessely, Magitot, and others, that the aqueous is partly resorbed by the capillary walls of the choroid and retina or by the anterior surface of the iris. But the iridocorneal angle is assigned an incontestable rôle, and Ham-

burger's aphorism, above quoted, is rejected as too exclusive.

The proofs adduced by Teulières and Beauvieux in support of their view are grouped as anatomical, physiological, and physiopathological.

The structure of the pectinate ligament, presenting as it does a definite meshwork layer upon layer, definitely indicates that this tissue, constituting the inner wall of the canal of Schlemm, is permeable to liquids.

The two French authors here quoted have always found the cavity of the canal of Schlemm to be lined with an endothelium, although this has been denied by other writers. The canal communicates with episcleral veins which open directly into its cavity. It also communicates with the trabeculæ of its inner wall (the pectinate ligament). At the Amsterdam congress Sondermann carefully described minute channels which communicate between the trabecular spaces and the interior of the canal of Schlemm.

The view that the canal of Schlemm is a venous sinus is favored by the embryological fact that it appears in the fetus at the same time as the episcleral veins, or about the seventh or eighth month. The canal of Schlemm is thus an intermediary between the anterior chamber and the episcleral venous system. The fact that blood cannot flow back into the anterior chamber by way of the pectinate ligament is explained by the difference of vascular pressure as between the exterior and the interior of the eye; and further (according to Sondermann) by the parallel arrangement of the narrow passages in the inner wall of the canal, for, in a condition of obliteration of the anterior chamber, these narrow passages are folded back upon themselves and compressed by the blood penetrating from the ciliary veins into the cavity of Schlemm's canal.

The filtration angle is not composed merely of the pectinate ligament and the canal of Schlemm, but includes also the iridociliary angle at the base of the iris, and the anterior surface of the iridic curtain. Furthermore, the filtration angle has its own special venous system in the form of the episcleral veins, the anterior ciliary veins, the muscular veins, and the anterior vortical veins of Seidel; and upon this special venous system devolves the evacuation, by osmosis, of a part of the aqueous humor.

Physiologically, the occurrence of filtration at the iridocorneal angle is supported by the effect of prolonged massage in lowering intraocular tension, and by experiments with injection of extremely fine grains of India ink which are subsequently found accumulated in the pectinate ligament, in the canal of Schlemm, in the ciliary veins at the base of the iris, in the crypts, and on the posterior surface of the iris. Similar results have been obtained by the injection of dyes. If venous stasis is induced by compression of the jugular veins, the color is no longer found in the episcleral veins; but as soon as the compression is relaxed the staining again appears.

Clinical evidence in favor of a filtration angle is furnished by the effect upon ocular tension of an obstruction to the flow of the aqueous from the posterior to the anterior chamber (seclusion of the pupil) or by complete anterior synechia; as well as by the effect of obstruction at the angle itself, such as may be produced by the presence of vitreous hernia or of lens substance in the anterior chamber. Moreover, the hypertension of infantile glaucoma is commonly recognized as due to congenital absence of the iridocorneal angle.

Thus, Teulières and Beauvieux argue in conclusion, a great variety of evidence points to the existence of a current of liquid toward this region, not an uninterrupted stream, but an insensible slow osmotic filtration, necessary for renewal and purification of the aqueous humor, rendered more intense by physiological activity of the eye, and particularly by the extrinsic and intrinsic muscular movements of accommodation and convergence.

W. H. Crisp.

BOOK NOTICES

Die Differentialdiagnose der wichtigen Augenerkrankungen und Augenverletzungen, mit einem Anhang über die Brillenbestimmung. (The differential diagnosis of important eye diseases and eye injuries, with a supplement concerning measurement for glasses.) By Professor Dr. Viktor Hanke, Vienna. With nineteen illustrations and three plates, 103 pages, octavo, stiff paper covers, price four marks. Verlag von Julius Springer, Vienna and Berlin, 1930.

This little work is written chiefly for the general practitioner; and in considering the various ocular diseases and ocular injuries the emphasis throughout is laid on differential diagnosis. The thirty-three page "supplement" on refraction has been inserted for the benefit of those general physicians who find it absolutely necessary to undertake this kind of work. The only illustrations in the volume are in this section, and the three plates are test charts. Anyone who pays serious attention to refraction will be surprised to find that the two distant test charts carry nothing smaller than the six-meter line, in spite of the fact that most people with good visual acuity can at least read some letters on a four-meter line when working at six meters. The section on refraction carries a number of other examples of the apparently primitive development of the art of refraction in German-speaking countries. For preliminary estimation of a hyperopic error, before the use of cycloplegia, it is recommended that gradually increasing convex spheres shall be slowly placed before the patient's eye until the vision is made worse by the next change! The principles for ordering spectacles in the presence of hyperopia are summarized as follows: as long as a hyperope has no signs of ocular fatigue in near work, he does not need a glass; if signs of fatigue appear, then for youthful hyperopes only the manifest hyperopia is corrected. Among the clinical examples of refraction work is mentioned a six-year-old child with a squinting left eye, who accepted plus three sphere for his right eye before cycloplegia, and plus six sphere under cycloplegia, and who was given plus three sphere for distance and an addition of plus three sphere for near. In discussing this case it is mentioned incidentally that at this age (six years) the accommodative power is 1.5 diopters!!! Apparently the only basis recognized for giving a presbyopic correction is an exact relationship between the age of the patient and the amount of plus sphere to be added. No wonder that (outside of myopic patients) more people wear glasses in the United States than in Germany!

The section on differential diagnosis is the only particularly valuable feature of this book, each part of the eye or of its adnexa being considered first as regards diseases and their symptomatology and then as regards injuries which may cause confusion in differential diagnosis. *W. H. Crisp.*

Ofthalmologicky Sbornik, volume 5, 1930. Collection of papers read before the fifth congress of the Czechoslovak Ophthalmological Society, 1930. (English, French, and German summaries attached.) Octavo, paper covers, 251 pages, price not stated. Published by the Czechoslovak Ophthalmological Society, Prague, 1930.

This volume contains merely the papers read before the fifth meeting of the society. Most, or all, of these papers will be abstracted in the American Journal of Ophthalmology. It is interesting to note that the first sixteen out of the forty-one papers are devoted to glaucoma, dealing with questions of experiment and theory as to the nature of glaucoma, the results of various surgical procedures, and special types of glaucoma. The abstracts into French, English, and German are adequate for the use of foreign readers, and add greatly to the usefulness of the volume.

W. H. Crisp.

Reports of eye clinics, session 1929-1930, hospital of the graduate school of medicine, University of Pennsylvania. By L. Webster Fox, professor of ophthalmology, graduate school of medicine, University of Pennsylvania. Paper covers, 40 pages, 1 illustration. Circulated by the author.

Merely to stand by and watch the operative and clinical procedures of an ophthalmic surgeon is of little utility except to the favored few who are allowed almost to rub elbows with the clinician or operator. But from the point of view of the guest physician an intelligent and intelligible running commentary greatly adds to the value of attendance in the operating or treatment room. This fifth volume of clinical reports includes the frank discussion by Professor Fox of an extensive series of cases as they were presented to interested visitors, at the Graduate Hospital and the Orthopedic Hospital, Philadelphia. The cases ranged from cataract extraction, strabismus, glaucoma operations, pterygium, and operations on the lids, to the surgical care of various types of injury or of complications of different kinds of conjunctival inflammation. The discussions are interesting and stimulate thought much in the same way as does the so-called "dry clinic". *W. H. Crisp.*

ERRATUM

In the October issue (page 938) the abstract of the paper by Waardenburg entitled "Refraction and research as to twins" was accidentally placed in the section on injuries, whereas it should have been included in section three, on physiologic optics, refraction, etc.

ABSTRACT DEPARTMENT

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is only mentioned in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. General methods of diagnosis
2. Therapeutics and operations
3. Physiologic optics, refraction, and color vision
4. Ocular movements
5. Conjunctiva
6. Cornea and sclera
7. Uveal tract, sympathetic disease, and aqueous humor
8. Glaucoma and ocular tension
9. Crystalline lens
10. Retina and vitreous
11. Optic nerve and toxic amblyopias
12. Visual tracts and centers
13. Eyeball and orbit
14. Eyelids and lacrimal apparatus
15. Tumors
16. Injuries
17. Systemic diseases and parasites
18. Hygiene, sociology, education and history

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2. THERAPEUTICS AND OPERATIONS

Blank, Adolf. **The use of argolaval in ophthalmology.** Klin. M. f. Augenh., 1930, v. 85, August, p. 257.

Argolaval is an organic preparation of silver which is more bactericidal than silver nitrate, but does not have the unpleasant tissue effect. Its bactericidal power is demonstrable in vitro and clinically it proved strikingly efficacious in the treatment of conjunctivitis. Even in diplobacillus infections it proved useful, as well as in corneal infections and lid-edge inflammations.

F. H. Haessler.

Di Marzio, Q. and Salvatori, G. B. **Results of x-ray therapy in some ocular diseases.** Saggi di Oftalmologia, 1929, v. 5, p. 5.

The ability to calculate exactly the x-ray dose received by the ocular tissues and the attendant effects obtained has standardized this method of treatment to the point where certain definite results are known. In inflammatory conditions such as corneal ulcers, parenchymatous keratitis, anterior uveitis, and so forth, weak doses are indicated; in trachoma and other specific affections medium doses, associated with iontophoresis, are of great benefit; and in malignant neoplasms no good can be obtained unless heavy doses are used.

The unit of measure adopted was that of the erythematous dose. In the experiments conducted, heavy rays, strongly filtered, were used almost exclusively. An important reason for this was the factor of practicability of administration to the patient in that the eyes could be treated under closed lids.

It was found that the rays of extremely short wave length, strongly filtered, exercised a potent curative action. In doses not exceeding 150 percent over a period of fifteen days, or not exceeding 250 percent over a period of forty-five days, no evident harm was done to the globe and its allied structures.

In the inflammatory forms the best effects are obtained with the local application of doses of about twenty percent of an erythematous dose.

In ulcerative keratitis, including keratohypopyon, catarrhal, herpetic, traumatic and rodent ulcers, improvement has been constant and rapid. In the eighty-six cases treated, 73.5 percent were cured, 17.5 percent were improved, and 9 percent remained unchanged.

Forty-two cases of parenchymatous keratitis, the majority of which were Wassermann positive luetic, and who received no antiluetic treatment during the exposures to x-rays, showed the following results: cured 38 percent and improved 54.5 percent; three remain

under treatment. Two to ten treatments were administered at five to eight day intervals.

Forty-six cases of uveitis, including twenty-eight which were tuberculous, thirteen luetic, two diabetic and three of unknown etiology, following treatment showed rapid consistent success; 35 percent were cured, 54.5 percent improved, and 10.5 percent recurred.

In trachoma good results were obtained, though not constantly. Sixty cases verified by histological examination, and rebellious to other forms of treatment, received exposures of one-half to one-third the erythematous dose. There were 18 percent cures, 72 percent notably improved, and 9 percent showed alternate improvement and relapses. Severe trachomatous pannus showed almost constant success. Of eighteen cases, 23 percent were cured, 61 percent improved, and 16 percent recurred. Marked improvement was noted in tuberculous conjunctivitis.

Good results were obtained in epibulbar epitheliomata and in gliomata, including two cases of permanent cure with restoration of vision. Pterygium and conjunctival keloid responded favorably to the treatment. No appreciable effect was noted in vernal catarrh, bulbar sarcoma or in retinal detachment.

In the treatment of three cases of hemorrhages in the vitreous, one showed permanent and the other two only temporary improvement.

F. M. Crage.

Esteban, Mario. **Local immunity in ophthalmology.** Rev. Cubana de Oftal. y Oto-Rino-Lar., 1930, v. 2, April, p. 291.

According to Besredka the phenomenon of immunity arises from the site of the infection. When the eye is the point of predilection for certain invading toxins it can develop a state that is refractory to their actions, exclusive of the general tissues of the host; this immunity arises without the general formation of antibodies.

In ophthalmology local immunity can be conferred by means of filtrations of old cultures that contain certain antigenetic bodies which are inimical to the development of that particular organism. These culture filtrates offer considerable facility of application, as they are adaptable to instillation, fomentation or injection. They have a rapid action that is seen especially in streptococcus and staphylococcus infections.

Local immunity is probably the dominant factor of cure in trachoma, since in man the conjunctiva is the only tissue susceptible to this infection. On this account Vancea conceived the idea of triturating particles of trachoma granulations with physiologic saline solution, and sterilizing it by exposure to 50 degrees centigrade for thirty minutes. The product was injected subconjunctivally, in doses ranging from 0.5 to 5 c.c., at three or four day intervals. This was followed by disappearance of the follicles.

The author attempted the same result by depositing the rasped particles of trachoma granulations in a flask, and after having shaken these with physiologic saline and glass balls for one-half hour he obtained a uniform opalescent liquid. In spite of being heated to 50 degrees this produced colonies of both staphylococcus aureus and xerosis bacillus. He therefore reheated it to 37 degrees for sixteen hours, and then for an additional half hour at 60 degrees. The product was proved to be sterile by inoculation and by injection into a rabbit's eye.

He then began subconjunctival injections in a trachoma patient of 0.5 c.c. of this fluid, increasing 0.5 c.c. each time, with rest periods of four days. One eye was treated and the other was used as a control. After the sixth injection all clinical signs of trachoma had disappeared. The method is still under experimentation. *A. G. Wilde.*

Fejer, J. **Urotropin in ophthalmology.** Klin. M. f. Augenh., 1930, v. 85, August, p. 254.

The author recommends urotropin as a valuable adjunct in the treatment of purulent infection in and about the eye.

The drug alone, however, cannot be relied upon to stop some infections.
F. H. Haessler.

Van Lint. **Some indications for tarsorrhaphy; indolent and progressive ulcer of the cornea, traumatic staphyloma of the sclera, contused perforating wounds of the anterior segment.** Soc. Franç. d'Opht., 1929, v. 42, pp. 170-175. (See Amer. Jour. Ophth., 1930, v. 13, Feb., p. 168.)

3. PHYSIOLOGIC OPTICS, REFRACTION, AND COLOR VISION

Mamoli, L. **Clinical value of the reading of the smallest type for near in emmetropes and certain ametropes.** Saggi di Oftalmologia, 1929, v. 5, p. 306.

The sizes of retinal images of various letters on test cards for near vision, in emmetropes as compared to various ametropes, were studied by the author.

He concludes that, while in an emmetropic eye with ability to read the smallest type, when accommodated to a distance of 50 to 60 cm., central scotoma can be excluded, the same does not apply in the case of a myopic eye of five to twenty diopters, because its retinal images are relatively much larger than images in emmetropic eyes.

This enlargement of the retinal images in the myopic eye is due to the reduced distance between the eye and the test types, necessary for their perception. This nearness to the test type indicates that the visual act, in these cases, is accomplished by the retina in the near vicinity of the macula, that is, by indirect vision.

The finest print was plainly perceived by one myope in whom there were macular myopic changes and a refractive error approaching thirty diopters, and by a second patient with high myopia, conus and a central scotoma for colors. The test card was held 5 to 6 cm. distant in each case.

The author suggests the use of small type characters for testing central vision for near. *F. M. Crage.*

Marinosci, A. **Variations in the retinal images and in the visual acuity as determined by the correcting lens in ametropia.** Ann. di Ottal., 1930, v. 58, May-June, p. 448.

The author measured the size of the retinal image in the ametropic axis and that of the corneal curve from 1 to 20 diopters, and with the correcting lens before and behind the anterior focal plane of the eye, with the following results. In axial ametropia the size of the retinal image with the correcting glass placed in the anterior focal plane is equal to that of the emmetropic eye. If the lens is placed beyond the anterior point in axial myopia the image is reduced. If placed nearer the eye than the anterior plane the image is increased in size. Contrary observations obtain in axial hypermetropia. In curvature ametropia if the correcting lens is placed 15 mm. from the cornea there is a reduction of the image in myopia and an increase in size in hypermetropia. Measuring the size of the circles of diffusion, in both axial and curvature myopia the size of the circles of diffusion is greater by the approximation of the lens than by its withdrawal. The opposite is found in both axial and curvature hyperopia. The conclusion is that, while in the myopia of curvature, according to its degree and the position of the correction lens, the circles of diffusion are always smaller than they are in axial myopia, in hyperopia the circles of diffusion are always greater in that of curvature than in the axial form. *Park Lewis.*

Ovio, G., and Hertel, E. **On the light sense.** Ann. di Ottal., 1930, v. 58, May-June, p. 385.

This is a continuation and completion of the paper begun in the April number and is a sufficiently complete study of the light sense to make a monograph on the subject. It includes such topics as the properties of graduated grays, optotypes and visual acuity, methods of examination, methods of obtaining obscurity and clarity, adaptation, special adaptation in the foveal

region, determination of sensibility, differentiation and so forth. (Extensive bibliography.) *Park Lewis.*

4. OCULAR MOVEMENTS

Caramazza, F. **Clinical considerations on a case of balance ptosis.** Riv. Oto-Neuro-Oft., 1930, v. 7, March-April, pp. 165-177.

A patient sixty years old showed incomplete ptosis of the right upper eyelid, paresis of all of the extrinsic muscles of the right eye supplied by the motor oculi nerve, and of the sphincter of the iris. As soon as the left eye was covered or the left lid was closed the right lid rose to almost the normal limit. The paretic symptoms disappeared after antiluetic treatment. The author concludes that the paresis was due to a luetic basilar meningitis. The palpebral phenomenon was probably due to the exclusion of the left eye from binocular vision, which eliminated the central inhibition that diplopia exerts on the nucleus of the third nerve, and also to an abnormal contralateral innervation of the paretic levator palpebræ muscle. (Bibliography.)
Melchiore Lombardo.

Neuschüler, I. **Considerations on paralysis of the abducens, with special regard to its therapy.** Riv. Oto-Neuro-Oft., 1930, v. 7, March-April, pp. 151-157.

The author examined three women, each of whom had been affected since childhood by paralysis of the left external rectus muscle. All three had enophthalmos and narrowing of the palpebral aperture. The Bernard-Horner syndrome had to be excluded because none of the three cases had typical miosis. The patients each had normal vision in both eyes, but complained of diplopia. The paralysis was due to destruction or aplasia of the nucleus of the abducens nerve as a result of encephalitis pontis of toxic and infectious origin. For surgical treatment the author favors the transplantation of the temporal sections of the superior and inferior recti muscles after Hummelsheim's method as modified by O'Connor. (Bibliography.)
Melchiore Lombardo.

Szekely, Josef. **A rare finding in oculomotor paralysis.** Klin. M. f. Augenh., 1930, v. 85, August, p. 229.

In a case of oculomotor paralysis there was a forty-five degree rotation of the eyeball about its axis. The cause of this torsion was definitely not a secondary contracture. It can be explained as a result of individually variable muscle tonus or an irritative lesion of the trochlearis. *F. H. Haessler.*

5. CONJUNCTIVA

Bedier, E. **Trachoma in Laos.** Rev. Internat. du Trachôme, 1930, v. 7, April, p. 71.

Although the remainder of Indo-China has been heavily infected with trachoma, Laos until recent years remained comparatively free. The economic development of the colony has resulted in a breaking down of natural barriers and consequent free communication with the neighboring peoples. Unrestricted immigration of infected Annamites and Chinese has resulted in a rapid increase in the incidence of infection. Certain centers which are not located along the main trade routes still remain comparatively unaffected, although it is to be feared that unless strenuous preventive measures are taken the whole colony will become involved. The author outlines a plan of medical inspection of immigrants which he feels could accomplish much in the control of the spread of the disease. *Phillips Thygeson.*

Belot, R. **Trachoma in the navy in North Africa.** Rev. Internat. du Trachôme, 1930, v. 7, April, p. 77.

Belot reviews trachoma as seen in naval service in Northern Africa. He also records a bacteriologic study of trachoma cases at the special clinic of Sidi-Abdallah. In the pure forms it was usual to find an absence of bacteria, but in the cases presenting a superimposed infection the Koch-Weeks bacil-

lus was found to be the most frequent invader. Next in order of frequency were the Morax-Axenfeld bacillus and the pseudodiphtheria bacillus. The gonococcus was never encountered. Belot also studied the reaction of Tricoire which was found to be positive in seventy percent of trachoma cases, but also in three of ten non-trachomatous cases.

In clinical study Belot found no relationship between syphilis or malaria with trachoma, although when syphilis and trachoma occurred together there seemed to be a tendency to the production of severe corneal complications. A very definite relationship was found between the condition of the rhinopharynx and the nose. Nasal obstruction, almost always adenoidal, was found regularly in the trachomatous, especially in the infant, and removal of these vegetations produced a manifest amelioration of the conjunctival condition in many instances.

Belot favors surgical over all forms of medical therapy and advised a methodical curettage of all involved tissue, palpebral, bulbar, and corneal, according to the method described by Cuénod under the name of xysis. When this form of treatment is refused, the author uses the sclerosing injections of Nicati, made twice a week into the upper cul-de-sac with a solution of two percent copper sulphate. This is followed by mild curettage, or massage with boric acid and copper sulphate powder or with chaulmoogra oil.

Phillips Thygeson.

Cuénod, and Natof, R. **Operative statistics in a trachoma country.** Rev. Internat. du Trachôme, 1930, v. 7, July, p. 139.

In a total of 1,639 operative interventions, 523 were xysis, which includes minute curettage of all trachomatous lesions, conjunctival and corneal, subconjunctival injections of cyanide of mercury, excision of semilunar folds, massage and so forth. Four hundred and seventy-two trichiasis, 151 tattooings, 113 optical iridectomies, 81 cataracts, 56 dacryocystitis, 40 pterygiums, 37 glaucomas, 27 strabismus, 16 enucleations, and 123 miscellaneous operations were performed. The authors call attention to the marked absence of postoperative infections even in old trachoma cases where the field is heavily contaminated. The absence of this complication is attributed to the marked resistance of primitive races to infection.

Phillips Thygeson.

Morax and Schouboe. **Trachoma in Tiaret and in Mzab.** Rev. Internat. du Trachôme, 1930, v. 7, July, p. 131.

In a survey of school children Morax and Schouboe conclude that trachomatous infection most frequently occurs in the family previous to the school period. Consequently more cases of florid trachoma are seen in the younger than in the older classes where the number of cicatricial cases increases. The authors also conclude that school contamination plays only a minor rôle, for in spite of the contact of healthy European children with infected ones, only two cases of trachoma were found among the former.

Phillips Thygeson.

Pochissoff, N. **A new operation for pterygium.** Klin. M. f. Augenh., 1930, v. 85, August, p. 250.

The operation consists chiefly of an abscission of the head of the pterygium and a plastic rearrangement of the remaining conjunctiva. In eighty patients the result was uniformly satisfactory.

F. H. Haessler.

Sédan, Jean. **Recurrences of trachoma following use of eserin.** Rev. Internat. du Trachôme, 1930, v. 7, July p. 152.

Three cases of ocular hypertension occurring in individuals with old apparently healed trachoma are revealed. In these a violent recurrence of the trachomatous process followed the use of eserin. In all the cases the granulations were most pronounced in the lower cul-de-sac where maximum concentration of eserin would naturally occur. The true trachomatous nature

of these granulations was established by the presence of corneal complications. *Phillips Thygeson.*

Talbot. **Trachoma brought from Egypt to Italy in the 13th century.** Rev. Internat. du Trachôme, 1930, v. 7, April, p. 112.

The crusades of the 12th and 13th centuries initiated an important movement between the Mediterranean ports of France and Italy and the Holy Land. The resultant relationships with Egypt and the Orient played a definite rôle in the diffusion of trachoma throughout Europe. The case of Francis of Assisi is a notable example. Saint Francis spent the years 1219-21 in Egypt and in Palestine. In 1223 he is described as having a severe ophthalmia, contracted in Egypt, with acute flareups during which he was almost blind. He had, then, a progressive bilateral trachoma with corneal invasion and cicatricial complications. In 1225, six years after onset, the complications were of such severity that medical treatment was tried. This treatment, which proved entirely ineffective, consisted of bleedings, vesication, local plasters and the application of the cautery iron to the temples. At the time of his death Saint Francis was practically blind. *Phillips Thygeson.*

Talbot. **Trachoma in the schools of the group of oases of Gabes (South Tunis).** Rev. Internat. du Trachôme, 1930, v. 7, July, p. 143.

Seven hundred forty-six cases of latent trachoma in school children in the oases of Gabes were indexed by Talbot according to MacCallan's classification. Seventy-seven were in stage 1, 219 in stage 2, 375 in stage 3, and 75 in stage 4. The cases completely cicatrized represented ten percent of the total. The author thoroughly agrees with the previous observations of Morax, Meyerhof, Aubout and others, that latent trachoma in infancy undergoes spontaneous healing in a considerable proportion of cases. He states, however, that spontaneous healing occurs rarely when the infection is acquired later in life.

Trapesontzewa, C. **Is the virus of trachoma filtrable?** Rev. Internat. du Trachôme, 1930, v. 7, April, p. 5.

Trapesontzewa inoculated the conjunctivæ of six persons, ranging in age from six to fifty-five years, with filtrates of trachomatous material obtained by expressions, curettages, and so forth. The material was triturated in small amounts of normal salt solution and then filtered through small filters, so designed that the final concentration of virus in the filtrate would necessarily be high. Inoculations were made by introducing the filtrate subconjunctivally or by rubbing it into the previously scarified conjunctiva. No changes occurred in the inoculated eyes over a period of six months. The author concludes that the virus of trachoma may be considered nonfiltrable.

Phillips Thygeson.

6. CORNEA AND SCLERA

Adrogue, Esteban. **Keratitis of Groenouw.** Arch. de Oft. de Buenos Aires. 1930, v. 5, June, p. 208.

This type of corneal disturbance is probably due to a dystrophy that interferes with normal nutrition. It is characterized by (1) absence of inflammatory phenomena; (2) constant tendency to increase, and (3) without inflammatory reaction being identified pathologically, but merely a degenerative process as in arcus senilis, band keratitis, or in hyaline degeneration.

The patient, a railway employee, was fifty-three years old. His only complaint was defective vision that had been noticeable for the preceding ten years. Vision was one-third in each eye. Within the corneal substance were rounded discolored bodies that lifted the surface into slight nodules. Both eyes were involved.

The slit-lamp showed that these bodies resembled the cicatricial changes of herpes, that is, they were situated in the superficial layers and looked like grains of powdered sugar. Between the lesions the cornea was slightly opalescent. The corneal nerves were distinctly visible. The eyes were normal otherwise, except for reduced corneal

sensitivity, and the general clinical examination was negative.

Various forms of herpetic keratitis, such as dendritic, letter-shaped and so on begin abruptly and show the usual inflammatory reactions. Groenouw's involvement begins insidiously and its inception can never be clearly fixed. The lesion is accompanied by the deposit of two types of substances; one lies immediately under the epithelium and stains with eosin, while the other is granular and basophilic and is situated in the parenchyma. The surface epithelium is thinned and its basal layer is deformed; in some places it is keratinized. The epithelial cells are filled with vacuoles and their nuclei stain poorly. Treatment is confined to massage with mercurial ointment, dionin to produce superficial hyperemia, and subconjunctival injections and iodides internally. *A. G. Wilde.*

Aubineau, E. **Corneal edema with hypercholesteremia.** Soc. Franç. d'Opht., 1929, v. 42, pp. 283-289. (See Amer. Jour. Ophth., 1929, v. 12, Dec., p. 1019.

Handmann, M. **Bilateral symmetrical epithelial groove in the lower half of the cornea.** Klin. M. f. Augenh., 1930, v. 85, August, p. 234.

These grooves in the epithelial layer of both corneæ were the only findings after the child complained of severe ocular pain. Bowman's membrane was intact, though the corneal nerves were easily visible in the region. In three or four days the eyes became entirely normal. No explanation was found.
F. H. Haessler.

Velhagen, K., Jr. **Double gerontoxon.** Klin. M. f. Augenh., 1930, v. 85, August, p. 264.

In a man seventy years of age a greyish white corneal ring was observed in or on Descemet's membrane central to a typical gerontoxon in both eyes. It was doubtless a second gerontoxon. It is difficult to explain the lucid interval between the two rings. The soundest speculative conception of corneal pathology is doubtless the hypothesis that all points on the cornea which are equidistant from the limbus are similar in biological activity, metabolism, innervation, and immunity. A comparison wth Liesegang's ring, produced in potassium dichromate gelatin on which a crystal of silver nitrate has been placed, is suggestive. *F. H. Haessler.*

Waardenburg, P. J. **Corneal refraction and corneal size.** Klin. M. f. Augenh., 1930, v. 85, August, p. 169.

As were other recent essays by the same author, this study is an analysis of many accurate measurements of various characteristics of the cornea. There is a degree of correlation between corneal refraction and corneal diameter, but it is not true that corneal refraction is a regular exponent of the value of the corneal diameter. Probably there is a definite correlation between the diameter and the radius of the cornea, but this applies only to its central segment. *F. H. Haessler.*

8. GLAUCOMA AND OCULAR TENSION

Herbert, H. **The future of iris inclusion in glaucoma.** Brit. Jour. Ophth., 1930, v. 14, Sept., p. 433.

Herbert has hesitated in recommending the general adoption of iris-inclusion because of failure to get entirely rid of the conjunctival bleb and the possible risk of sympathetic ophthalmitis. He now believes that needful control over conjunctival changes has been secured.

In most of his more recent operations for chronic primary glaucoma the iris has been intentionally detached from its base locally by the downward pull of the iris forceps, before being drawn up to be cut meridionally with scissors beneath the conjunctiva. Perfect results have followed.

Iridencleisis cannot justify itself unless it brings a reasonable hope of a permanent relief of tension, together with complete protection against late infection, as provided by localized conjunctival fibrosis. This fibrosis prob-

ably is the result of friction and pressure by the upper lid, and possibly also the iridodialysis has effectually weakened the dilatator muscle of the iris.

The contribution discusses methods of clearing away conjunctival bacteria as a possible cause of sympathetic ophthalmitis. In place of the old iridectomy by far the safest and best operation is the smallest subconjunctival iridectomy that can be made and leave the iris incarcerated. Details of the preparation of the field and technique of the operation are described in full. The anterior chamber is opened with a small keratome, the point of which pushes forward a 6 or 7 mm. section of conjunctiva before it enters the chamber. *D. F. Harbridge.*

Terrien, F., and Veil, P. **Concerning certain so-called primary glaucomas.** Soc. Franç. d'Opht., 1929, v. 42, pp. 349-368. (See Amer. Jour. Ophth., 1929, v. 12, Oct., p. 862.)

9. CRYSTALLINE LENS

Letchworth, T. W. **An unusual complication of traumatic cataract.** Brit. Jour. Ophth., 1930, v. 14, Sept., p. 450.

A male patient, aged forty-four years, unknown to himself had a piece of steel 2 mm. in length lodged in his lens. How long it had been present was unknown. The observer elected to defer treatment until the lens became opaque. The tension having increased, after waiting two weeks, a preliminary iridectomy was performed. The eye remained quiet for one month after the operation, and then became suddenly painful. The anterior chamber was deep and the opaque lens could be seen lying in the vitreous below and behind the pupil.

Guarded by a conjunctival flap, the broken lens with the foreign body was removed in the usual manner. A vectis, which was introduced preceding the removal of the lens, met a definite resistance in passing through the intact anterior capsule. The lens cortex had entered the vitreous by bursting through the posterior capsule.

D. F. Harbridge.

Trantas. **Senile lesions of the anterior lens capsule and pupillary border.** Soc. Franç. d'Opht., 1929, v. 42, pp. 317-327. (See Amer. Jour. Ophth., 1930, v. 13, Feb., p. 180.)

10. RETINA AND VITREOUS

Archangelsky, W. N. **An attempt to treat vitreous opacities.** Klin. M. f. Augenh., 1930, v. 85, August, p. 247.

In two patients in whom the usual therapy for vitreous opacities had failed, a single blood transfusion was followed by striking improvement in vision. *F. H. Haessler.*

Dejean. **Notes upon the form and structure of the vitreous body as seen with the slit-lamp.** Soc. Franç. d'Opht., 1929, v. 42, pp. 423-428. (See Amer. Jour. Ophth., 1930, v. 13, Feb., p. 181.)

Duke-Elder, W. S. **The vitreous humor.** Trans. Ophth. Society United Kingdom, 1929, v. 49, pp. 83-109.

This paper, which does not lend itself to abstract, discusses the detailed chemical analysis of the vitreous body, as studied in the horse, and also the physical properties of the vitreous, with certain possible applications to future lines of investigation concerning the treatment of glaucoma and retinal detachment. *A. B. Bruner.*

Hamilton, J. Bruce. **On looking for holes in detached retina.** Brit. Jour. Ophth., 1930, v. 14, Sept., p. 455.

In order to expedite the quest for holes, before doing ignipuncture, the writer divides detachments into two groups, those in which he does not expect to find a hole and those in which he expects to find one. Under the first group are cases with neoplasm and those with inflammatory detachments. In the second group there is a history of the part of the field in which the visual loss was first appreciated. The pupil should always be dilated, because holes are frequently well forward.

The types may be a tear near the ora serrata, small round holes or horseshoe shaped rents. The presence of old choroiditis must be borne in mind.

Multiple holes are by no means uncommon. Their position may be above, temporal, nasal or below. The fallacies of atrophy of the retina and clefts must be guarded against. In aphakic eyes detachments occur usually thirty or forty years after needling. It is almost impossible to find a hole in them.

D. F. Harbridge.

Hughes, Nicholas. **The structure of the vitreous.** Trans. Ophth. Soc. United Kingdom, 1929, v. 49, pp. 407-420.

Hughes's investigations were made in the eyes of slaughtered sheep. The eyes were examined within thirty minutes after death, both as to gross structure of the vitreous and by means of the slit-lamp. Numerous interesting drawings are included. The vitreous was found to have a slender attachment to the optic disc and a much firmer union to the ciliary processes, while the interior of the vitreous was occupied by membranes having peculiar arrangements shown in the author's diagrams.

A. B. Bruner.

Koyanagi, Y. **On the relation of the choroidal vessels in the development of star figure in the macula.** Klin. M. f. Augenh., 1930, v. 85, August, p. 237.

The author describes the histological findings in an eye with a star figure of the macula in a patient in whom there was neither clinical nor anatomic evidence of nephritis; there was, however, an intracranial neoplasm. At the posterior pole there was an accumulation of fat cells and under it the choroid was poor in vessels and was thinner. Koyanagi believes that characteristic grouping of the fat-infiltrated cells (visible ophthalmoscopically as a star of the macula) is not dependent on some anatomic structure such as Müller's supporting cells, but rather on a current of the tissue fluids in the avascular outer retinal layers in this region.

F. H. Haessler.

Lindner, K. **A new method of localization of places in the fundus and its use in Gonin's treatment of retinal detachment.** Graefe's Arch., 1929, v. 123, p. 233.

The patient with detachment of the retina is seated before a Gullstrand ophthalmoscope around the barrel of which a 180° perimeter arm can be rotated. A tiny point from an electric light, movable on the perimeter arm, is fixed by the affected eye. When the retinal tear can be seen with the ophthalmoscope, the angle of rotation φ of the perimeter arm from the horizontal plane and the angle ε on the perimeter arm are noted. Then, with a small circle made of thin metal of a size corresponding to the circumference of the eyeball at the limbus furnished with a horizontal metal strip, the angle φ from the horizontal meridian is set off by a second metal strip rotating about an axis at the center of the horizontal strip. This second metal strip is chosen of such a length (taken from a curve of distances equivalent to the angles ε) that, when the metal circle is sutured to the corneal limbus in such a position that the horizontal strip of the circle is just anterior to the horizontal meridian of the cornea, the end of the metal strip rotated to the proper angle φ just reaches to the retinal tear.

Lindner appends to this article his results of applying Gonin's operation in twelve cases of retinal detachment showing retinal tears; these twelve were among twenty-two cases of retinal detachment which appeared in his clinic between November 1, 1928, and the end of July, 1929. In ten of these cases the retinal openings were struck at the first cauterization; in the remaining two there were present so many vitreous opacities that it was impossible to tell whether the holes were reached. In seven cases there was complete replacement of the retina (the most recent case was observed for over three weeks and the oldest over eight months). The longest tear, measuring about six disc diameters, healed after three cauterizations. The first five cases were cauterized according to Gonin's advice, i.e. from two to three seconds. All the later cases were cauterized from ten to 15 seconds. Five of the seven later cases

were cured, three after one cauterization, one after two and one after three cauterizations. Lindner thinks that Gonin's treatment is one of the most important advancements in recent ophthalmology. *H. D. Lamb.*

Lindner, K. **Retinal detachments and their present day treatment.** Wien. med. Woch., 1930, v. 80, June 28, p. 883.

The Gonin method has radically changed the prognosis of retinal detachment. Optimism has taken the place of pessimism in our attitude towards serious detachments, whether spontaneous or due to trauma. The reattached retina may recover its function even after several months of detachment. The macular region offers, of course, the least favorable prognosis. Electrocauterization for ten to fifteen seconds and suture of the scleral opening when practicable are among the features of the Lindner technique. One case has been operated on successfully after one and a half years with reattachment lasting, so far, three and a half months. One case of those previously reported as cured has had a relapse, while two permanent cures more are added to the fifteen reported cures out of the thirty-eight cases operated upon. *M. Davidson.*

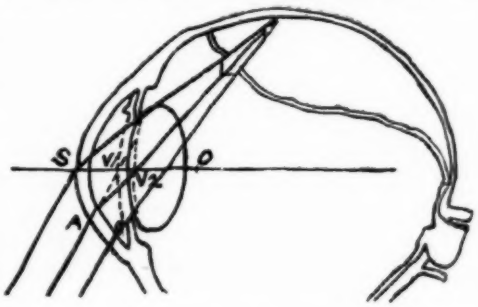
Safar, Karl. **A localizing ophthalmoscope for the operative treatment of retinal detachment.** Zeit. f. Augenh., 1930, v. 71, July, p. 307.

Gonin's view that cauterization of a detached retina is successful only when the edges of a retinal tear are caused to close is gaining general acceptance. The author devised this apparatus to replace the complex instruments and calculations which because of their manifold sources of error often lead to incorrect localization. It consists essentially of a Gullstrand hand ophthalmoscope mounted on a rigid bar with a cross hair and an electric thermocautery mounted in its optical axis. The cautery is inserted through an opening in Tenon's capsule. When the retinal tear is sighted and brought into line with the cross hair the current is turned on. The hot cautery then punctures the eyeball.

F. H. Haessler.

Salzmann, M. **The determination of place in the ocular interior.** Graefe's Arch., 1929, v. 123, p. 252.

For the determination of the opening in the detached retina, three coordinates must be obtained: the meridional plane, the line in the meridional plane and the point in the line where the opening lies. By means of a perimeter and an electric ophthalmoscope movable upon the perimeter arc, the position of the meridian and visual angle are obtained. A simple geometrical construction is then made with circle, ruler and scale. From a horizontal



line to represent the visual axis of the eye, the correct visual angle obtained from the perimeter is measured off and a line at this angle drawn to represent the visual line to the retinal opening. From the point V_1 on the visual axis line where the visual line crosses it, there is measured off the apparent depth of the anterior chamber and at that point is marked the corneal vertex S. With the ophthalmometer the radius of the cornea is measured. This is scaled off on the horizontal visual axis as SO. With this radius one lays off an arc from O to represent the anterior corneal surface passing through S. The point A is thereby also obtained where the visual line from V_1 crosses the anterior corneal surface. From the knowledge of the corneal radius, the true depth of the anterior chamber is obtained from the apparent depth by means of tables which the

author gives. From the Helmholtz schematic eye no. 2 it has been found that the lens picture of the pupil lies 0.1 mm. behind the true pupil, or at V_2. If now we connect the point A with V_2 by a straight line the retinal opening L must lie in the extension of that straight line. At what point in this line the opening L lies is obtained through the refraction of the margin of the opening. We must determine (by retinoscopy) the refraction of the margin of the opening for every principal section which lies perpendicular to the meridional plane. *H. D. Lamb.*

Sédan, J. **Temporary blindness from retinal angiospasm associated with malaria.** Soc. Franç. d'Opht., 1929, v. 42, pp. 428-436. (See Amer. Jour. Ophth., 1930, v. 13, Jan., p. 82.)

Shoji, Y. **On the successful treatment of retinitis with "AO."** Klin. M. f. Augenh., 1930, v. 85, 1930, p. 161.

"AO" is a tubercle antigen prepared by three Japanese investigators. With it the author successfully treated cases of retinitis characterized essentially by multiple white spots, hyperemia of the optic disc, dilatation of the veins with hemorrhage, but without vitreous opacities or signs of anterior segment inflammation. In two of the patients the Pirquet reaction was positive. On the basis of the clinical pictures the author considers that his patients may have had Coats's retinitis exudativa, retinitis pseudoalbuminurica, or tuberculosis; Shoji decides in favor of the latter because of his uniform therapeutic success. *F. H. Haessler.*

11. OPTIC NERVE AND TOXIC AMBLYOPIAS

Behr, C. **Experimental choked disc in man.** Zeit. f. Augenh., 1930, v. 71, July, p. 19.

Behr had the opportunity to produce papilledema experimentally in man. The results were a proof of the adequacy of his theory to explain the pathogenesis of papilledema. In a man whose entire orbital contents had to be resected because of carcinoma of the antrum, Behr ligated the optic nerve two centimeters behind the bulbus without interfering with the blood circulation. Ten minutes later the disc margins were unequivocally hazy and in twenty minutes there was distinct swelling of the disc, enlargement of the veins and narrowing of the arteries. In thirty minutes the nerve head protruded noticeably. At the end of ninety minutes when the operation on the sinus was complete the orbital contents were excised at the optic foramen. The microscopical examination showed typical papilledema. There was no dilation of the vaginal sheaths, nor any evidence of edema of the axial perivascular connective tissue. The edema involved only the nerve fibers which were undoubtedly spread apart.

The experiment shows: (1) That in choked disc the edema of the optic nerve and disc can arise only from an increase of a normally present parenchymatous and autochthonous fluid; (2) that in the optic nerve of man there is a movement of this parenchymatous fluid within the nerve from the disc; (3) that accumulation of fluid in the vaginal sheath has nothing to do with choked disc; and (4) that dilatation of the veins and contraction of the arteries is brought about by increase in intraneural pressure which results from edema and not from congestion of fluid in the vaginal sheath.

Behr also refers to a report in the Italian literature wherein the distribution of infection in the nerve stem secondary to an embolic abscess demonstrates the same parenchymatous flow. *F. H. Haessler.*

Contreras, F. **A case of atypical coloboma.** Arch. de Oft. Hisp.-Amer., 1929, v. 29, Dec., p. 716.

Contreras presents a case of coloboma of the optic nerve proper in which the excavation and the hooks of the vessels were on one side of the disc instead of below, the other side being at a level with the retina. (Colored picture.) *M. Uribe Troncoso.*

Gapeeff, P. I. **The treatment of optic nerve atrophy with atropin.** Klin. M. f. Augenh., 1930, v. 85, August, p. 203.

In almost all cases of optic atrophy treated with atropin there is temporary improvement, though at the end of the year the visual acuity is again at the starting point or lower. The drug probably acts by producing active hyperemia rather than by stimulating the nerve fibers. *F. H. Haessler.*

Koyanagi, Y. **Cavernous optic atrophy.** Graefe's Arch., 1930, v. 123, p. 537.

In extreme myopia with typical hollow space formation in the optic nerve it is not always necessary to assume that glaucoma must be associated with the myopia, since in the author's opinion cavernous optic atrophy no longer has a specific significance for the diagnosis of glaucoma. This opinion is rooted strongly in the fact that in growing orbital tumors with extreme exophthalmos the optic nerve is frequently cavernously degenerated at its ocular end. The conception that a glaucoma is always present in cases of orbital tumors with increasing growth has not been proved. Among thirty-three cases of orbital tumors, in which the intraocular tension was taken at different stages of the development, there was but one where a glaucomatous increase of tension was recognized. In the overwhelming majority of cases the tension was noted as considerably diminished. In three cases of orbital tumor, the author could affirm that a considerably diminished tension quickly returned to the normal level after the extirpation of the neoplasm.

The development of typical spaces in the optic nerve in cases of orbital tumors with high-grade exophthalmos as well as in glaucoma cases, is explained by the tearing of the excessively extended optic nerve fibers with formation of spaces where the fibers are least resistant. *H. D. Lamb.*

Kyrieleis, Werner. **The occurrence of multiple abscesses in the optic nerve in streptococcus sepsis.** Klin. M. f. Augenh., 1930, v. 85, August, p. 194.

In a patient with general hemolytic streptococcus sepsis an ophthalmoscopic examination shortly before death revealed red and slightly hazy discs, great dilatation of veins, and many superficial hemorrhages. Microscopic preparations revealed multiple minute abscesses in both optic nerves and discs, hemorrhages into the fiber layers of the retina. The deeper layers of the retina, as well as choroid and ciliary body, were free from striking changes. The author explains the unusual situation of the metastatic abscess by assuming that a perineuritis secondary to general sepsis had so influenced the circulation of the nerve that infected emboli would readily become lodged there. Another noteworthy observation is the association of a fundus picture resembling retinitis septica in a case of metastatic ophthalmia. It suggests that there is not an accidental association, but that there are continuous transitions between the two clinical pictures. *F. H. Haessler.*

Loddoni, G. **The course of the nerve fibers of the optic nerve and the retina.** Ann. di Ottal., 1930, v. 58, May-June, p. 468.

The author made his studies on the eyes of rabbits. His research shows that there is a systematic disposition of the fiber topographically, in that those in the periphery of the nerve reach their terminals in the periphery of the retina. In harmony with numerous clinical experiences the same fact holds good in the human eye, with the exception, of course, of the papillomacular bundle. (Bibliography.) *Park Lewis.*

Mita, H. **Experimental observations on cavity formation in the extremely extended optic nerve.** Graefe's Arch., 1929, v. 123, p. 258.

After the hairs on the skin of the eyelids of a rabbit were cut as close as possible and Harder's glands or lacrimal glands at the inner canthus extirpated, the eye was luxated and

prevented from returning to its normal position by two sutures through the lid margins and through the eyeball at the outer and inner sides beyond the cornea. In this way a permanent exophthalmos of from 9 to 12 mm. was produced. The experiment was performed on eleven rabbits. Anatomical examination of the excised eyeball and optic nerve showed that the extreme extension of the optic nerve had caused tearing of several nerve fibers in the less resistant part, mostly at the ocular end. The cavity formation thereby produced in the optic nerve corresponds completely with the finding that we are accustomed to see not only in the glaucomatous diseased eye but also in orbital tumors of different kind.

H. D. Lamb.

Scardapane, F. **Quinine amaurosis and amblyopia.** Saggi di Oftalmologia, 1929, v. 5, p. 62.

Seven cases of quinine amaurosis and amblyopia have been studied and reported by the author. The principal purpose of this clinical work was to ascertain the pathological aspect of ocular quinine poisoning.

One case showed its first ocular signs twenty-nine days after the ingestion of large doses of quinine. All of the cases observed showed the characteristic toxic gastrointestinal symptoms. Central vision was slightly, if at all, affected in the uncomplicated cases; but one with a history of keratitis, another with luetic iritis and a third, myopia with choroiditis, all showed diminished central vision attributable to the several preexisting diseases.

The characteristic retinal vasoconstriction, pale disc and cherry red spot at the macula were present in these cases. The pupil, fixed and dilated during amaurosis, rapidly returned to normal along with the return of vision.

The visual fields showed irregular constriction for all colors and especially for white. The others were superimposed and inverted. Absolute scotomas for white were present and disposed eccentrically; they varied in form, size and position at successive examinations. The white fields showed rapid improvement.

Hysteria and tabes must be excluded. Hysteria shows regular, not irregular, peripheral field constriction and no scotoma. Tabes shows practically no vascular changes, but a gray disc with clean edges, Argyll Robertson pupil, a tendency to miosis and characteristic general nervous symptoms.

The followers of the vasoconstrictor theory of pathogenesis attribute the less destructive action of quinine on the fovea to the great vascularity of the macular region.

This author states that this cannot be true because it is anatomically incorrect. The fovea is not provided with retinal blood vessels; the network of capillaries stops short at its periphery where their interspaces are larger. Further, he is in accord with Ballantine, whose hypothesis holds that quinine has a selective toxic action on the rods.

F. M. Crage.

Vestergaard, J. D. E. **Case of calcification in cerebrum (solitary tuberculoma).** Det oftalmologiske Selskap i København's Forhandlinger, 1929, p. 49. In Hospitalstidende, November, 1929.

The patient was an eighteen-year-old girl who six years previously had begun to have tremor of the hands to such an extent that she had had difficulty in writing; she had also had attacks of temporary loss of vision. Later there had occurred periods of somnolence. Three years before she had begun to have short attacks of unconsciousness. Her eyes then had shown choked discs of about four diopters. Examination again three months before had shown about the same degree of choking; vision normal in right eye, somewhat reduced in left; and fields normal except for an enlargement of both blind spots, most marked on the left. There was a marked increase in the pressure of the spinal fluid; cerebrospinal fluid negative except for a positive Pirquet test. Roentgen rays showed a group of

pea-sized shadows, from three to six centimeters above the sella turcica. The diagnosis of a cerebral tumor with calcifications, possibly a tuberculoma, was made. She was treated with light and roentgen ray and finally by a decompression of the cranium. Marked improvement in symptoms took place.

D. L. Tilderquist.

12. VISUAL TRACTS AND CENTERS

Beauvieux. **The true origins of the oculomotor nerve in the cat.** Soc. Franç. d'Opht., 1929, v. 42, pp. 484-494. (See Amer. Jour. Ophth., 1930, v. 13, Jan., p. 84.)

Cairns, Hugh, and Goulden, Charles. **The ocular manifestations of head injuries.** Trans. Ophth. Soc. United Kingdom, 1929, v. 49, p. 314.

Papilledema in head injuries is not common. Where present it is usually of comparatively late onset and its absence in the early days of treatment does not exclude the possibility of intracranial hemorrhage. When papilledema does develop, operative treatment is indicated. Those cases reported of rapidly developing bilateral choked disc with retinal hemorrhages are not the usual type of cases found with head injuries, but suggest hemorrhage into the optic nerve sheath.

Lateral deviation of the head and eyes is an extremely important symptom as an indication of the side of the major lesion. The onset of this sign in patients after head injury is an indication that the chief intracranial lesion is on the side toward which the deviation occurs.

The pupillary signs are also of great importance. Dilatation and fixation of one pupil usually indicates the side of the major lesion. This sign may occur with a homolateral hemiplegia. The hemiplegia would point to a lesion of the opposite side of the brain, but many cases, verified by autopsy, show the pupillary signs to be a more reliable indication of the site of greatest brain injury.

Unilateral dilatation and immobility may be preceded by a period in which the pupil is contracted and fixed. The sign may also be of only short duration, so should be looked for at frequent intervals. It should also be noted that there are many cases of severe head injuries where this symptom is absent.

Injuries of the occipital lobe result either by direct trauma or by contrecoup. Hemianopsia must occur in many of these patients. Defects in the fields, however, may be transitory, may be very difficult to elicit and probably are frequently not sought for at all. Word blindness and letter blindness probably does occur in a few cases, but may be marked by the general disturbance of consciousness.

Injury of the fiber tracts and nuclei that control associated parallel movements is probably a rare finding, but has been recorded in at least one case.

Disturbances of vision in persistent cerebral contusion are especially common. Subjective visual complaints such as soreness behind the eyeballs, photophobia, blurring of the printed page and transient diplopia are common stories. The symptoms are usually ascribed to functional derangements, but it is possible that there is a real organic basis for them.

Direct injury to the optic nerve and optic chiasm presents a series of symptoms too well known to require reviewing. Injuries to the nerve are most common after a blow on the external angular process. That these are due to a fracture through the optic foramen, as usually thought, is, however, an unproved hypothesis.

The cranial nerves are frequently involved. In order of frequency they are the facial, abducens and oculomotor, very rarely the trochlear or trigeminal.

Traumatic pulsating exophthalmos as a sequel of head injuries is well known. One should remember, however, that its onset is often delayed and its development usually gradual.

Orbital hemorrhages are only of importance when severe enough to produce proptosis. For the sake of completeness, mention is made of injuries so severe as to produce either forward or backward dislocation of the eyeball.

In conclusion, while the authors have written most comprehensively and clearly, mention might have been made of the mild cases of enophthalmos without apparent visual or muscular damage, which we have all seen at times. *A. B. Bruner.*

Hoff, H. and Hoffman, T. **The genesis of the visual aura.** Med. Klin., 1930, v. 26, Aug. 8, p. 1181.

Two cases of epilepsy following skull injuries with interesting visual auras are analyzed. The first case developed an epileptic seizure one year after a comminuted depressed right parietal fracture had been sustained and treated surgically by the removal of bone fragments. The aura was at first a clear picture of a desert landscape (the injury occurred while the patient lived in Morocco); on the patient's return to Germany each aura would reproduce the surroundings of the preceding attack. The second case was that of a nonpenetrating lower occipital injury sustained during the war and followed by epilepsy to which a visual aura was added three years later following shock on discovery of wife's infidelity. In this case the aura consisted in seeing his wife "deathly" pale in a world that had suddenly become devoid of color, including the patient himself when seen in a mirror. In the two cases the pictures were definitely flat, like that of a photograph, without any distinction between foreground and background, such as is present in a real visual perception.

The first case is explained on the basis of an injury to the intraparietal sulcus to which Poetzl assigns the function of regulating the impulses passing from the sensorial area to the visual area, and the impairment of which allows the passage of an impulse unhindered. In the second case there is assumed an injury to the accessory visual area whose function is, according to Poetzl, that of mediating color vision and the separation of foreground from background in the visual perception, and whose function is in abeyance when the visual center is overstimulated. Under irritation the frontier between the organic and psychogenic disturbances disappears, since the psychic event must use the physical cerebral pathways. The mutability of cerebral and hysterical disturbances is analogous to the mechanism of conversion in psychoanalysis.

M. Davidson.

13. EYEBALL AND ORBIT

Hamilton, J. B. **Notes on B. Welchii infection of the globe.** Brit. Jour. Ophth., 1930, v. 14, Sept., p. 452.

The author reports two cases of his own and a third, which he saw, of this unusual infection. The two cases reported in detail followed intraocular foreign body injuries. The first showed a piece of steel deep in the vitreous, and attached to it was a large air bubble. Some twelve hours after the removal of the metal, the chemotic conjunctiva protruded between the lids. A hypopyon was present. Cultures from the enucleated eye showed Staphylococcus albus and B. Welchii.

The second case suffered a severe ocular pain a few hours after having been injured by an intraocular foreign body. A slight conjunctival infection and a marked corneal haze were present, but no hypopyon, gas, or exudate was found in the anterior chamber. Upon opening the anterior chamber to remove the foreign body, several gas bubbles escaped and some exudate with a fetid odor escaped.

Cultures from the enucleated eye yielded pure B. Welchii. The first case is classed in group A, a mixed infection of B. Welchii and a pus-forming organism. The second case belongs to group B, a pure infection of B. Welchii.

Cases of the first group have a rapid onset, drowsiness, flushed face, moist warm skin, marked pyrexia, marked increase in pulse rate, red eye, bright cornea and hypopyon, but not much pain.

Those of the second group have a very rapid onset, intense pain, marked restlessness, ashen complexion, moist cold skin, little or no pyrexia, very slight increase in pulse rate, eye white

or slightly injected, marked corneal haze and a stringy exudate in the anterior chamber. *D. F. Harbridge.*

Melanowski, W. H. **Orbital phlegmon from scarlet fever.** Riv. Oto-Neuro-Oft., 1930, v. 7, May-June, pp. 223-229.

The author reports the cases of five children, each of whom was affected by a phlegmon of the orbit as a complication of scarlet fever. In one case both orbits were affected. The orbit, which was incised at a proper time, was found to communicate with the ethmoid, where the infection originated. The streptococcus hemolyticus was the causative factor. The ethmoid was drained through the nose with good results for the orbit of the same side. *Melchiore Lombardo.*

Ridley, F. **Gas gangrene panophthalmitis.** Trans. Ophth. Soc. United Kingdom, 1929, v. 45, p. 221.

This is a complete report of a case of this rare condition, thoroughly studied and of fortunate outcome.

A. B. Bruner.

Szily, A. **Models demonstrating normal embryology of the eye and some developmental anomalies.** Klin. M. f. Augenh., 1930, v. 85, August, p. 210.

The author describes some typical embryological models which are now commercially reproduced from accurate waxplate reconstructions from Szily's collection. *F. H. Haessler.*

Wolff, E. **A note on the pathology of orbital hemorrhage and inflammation.** Trans. Ophth. Soc. United Kingdom, 1929, v. 45, p. 195.

The transudation and dilatation of the capillaries which normally accompany the absorption of a hemorrhage or the resolution of an inflammatory process, show themselves clinically as a swelling. This dilatation of the capillaries cannot easily take place in a confined space. Such is true in the cranium and in a similar manner in the orbit. In the latter the only way that swelling can manifest itself is directly forward and even here the fascial septum, tarsal plates and canthal ligaments offer great resistance.

Relief of tension in the orbit would tend to aid in clearing up such orbital disturbances. The author lays stress on the fact that the hemorrhage, or inflammatory process, may be either inside or outside the muscle cone, hence operative incision must be made with this fact in mind. The paper emphasizes several important points worth remembering. Incidentally the case reported to illustrate the article is entirely inconclusive, and might just as well have been omitted.

A. B. Bruner.

14. EYELIDS AND LACRIMAL APPARATUS

Arruga, H. **Operative treatment of epiphora arising from obstruction of the duct.** Rev. Cubana de Oftal. y Oto-Rino-Laring., 1930, v. 2, April, p. 271.

This well illustrated article describes the author's technique of dacryocystorhinostomy, following largely the Toti technique. Operation is indicated where epiphora exists due to an obstruction in the nasal portion, with or without obstruction or suppuration of the sac. The canaliculi, especially the inferior, should be permeable. No operation is attempted in the presence of facial paralysis, or an acute nasal inflammation. With serpiginous ulceration the operation is indicated the same as is the sac extirpation.

Anesthesia is effected in the nasal mucous membrane by cotton saturated with adrenalin and four percent cocaine. Five minutes later an injection is made of two percent novocain and adrenalin into the internal upper angle of the orbit and the skin area of the sac. This is then massaged to produce general dispersion of the solution. Another injection is then made along the anterior crest.

The usual skin incision is made: then the canthal ligament divided and turned backward. The sac is carefully separated from its bed as far as the

posterior crest. The lacrimal fossa thus laid bare is perforated with a machine-driven trephine 8 to 10 mm. in diameter, its edges being made smooth with a burr. Both the nasal mucous membrane and posterior sac wall are incised vertically in the center of the bone defect. Their posterior portions are then sutured together with fine silk, the anterior lip of the sac incision being then fastened to the fibrous covering of the bone. The skin is brought together with a running silk suture, its ends being left free.

An antiseptic ointment is applied to prevent adhesion of the dressings, and a bandage is applied. The patient is cautioned that he must not sneeze violently lest he produce emphysema of the face. The bandage is changed daily and the lacrimal passages are irrigated with physiological saline solution. The sutures are removed after four days and the bandage omitted.

If epiphora should reappear the inferior canaliculus is irrigated and its nasal opening inspected. Cotton saturated with adrenalin and cocaine is placed over this area, and, after an interval a sound is introduced as far as the septum. The nasal opening is then cleared of obstruction. This can be repeated several times if necessary. Should epiphora still exist, the sac is extirpated. By this technique the author reports ninety percent of cures out of 140 cases. *A. G. Wilde.*

Dudinov, O. A. **Alcohol injections in the treatment of spastic entropion.** Russkii Opht. Jour., 1930, June, pp. 809-814.

In ten cases of spastic entropion one c.c. of eighty percent alcohol was injected under the skin of the eyelid under novocain anesthesia. The injection was entirely painless. It was usually followed by a considerable edema which slowly disappeared in eight to ten days. The effect of this procedure was uniformly good.

M. Beigelman.

Friede, R. **On the possibility of surgically reducing the translucence of albinotic lids.** Klin. M. f. Augenh., 1930, v. 85, August, p. 186.

After pointing out the reasons for the failure of previous attempts to reduce the light intensity that reaches the albinotic eye (the methods were essentially conjunctival, subconjunctival, and intratarsal injections of suspensions of opaque substances), the author outlines his successful method of intratarsal implantation of an opaque solid. He uses a sheet of gold, platinum, black celluloid, or fat. *F. H. Haessler.*

Hartmann, K. **Modified Hess ptosis operation in a case of blepharochalasis with mild atonia of the levator.** Klin. M. f. Augenh., 1930, v. 85, August, p. 243.

The operation was done because of interference with vision. The technique different from that of Hess in that the author excised a strip of skin 1.5 cm. wide from the lower lip of the dermal wound. He assumed that there was an atrophy of the fibrous tissue which binds the skin to the muscle as in true skin muscles. *F. H. Haessler.*

Meller, J. **Diseases of the lacrimal apparatus.** Trans. Ophth. Soc. United Kingdom, 1929, v. 49, p. 233.

The author first reviews the history of the treatment of diseases of the lacrimal apparatus. The bases of our present day procedures date back some hundreds of years.

Epiphora is discussed from the standpoint of the anatomy. This condition occurs more than three times as often in women as in men, and very much more commonly in the white race than in negroes.

Roentgenological examination of the sac and duct gives us a perspective of normal and pathologic conditions in the living patient. The best agent to use for this purpose is lipiodol. In a diseased sac and duct one can by such means discover the location and degree of stenosis, size of the sac, alterations in the bone, and the actual width of the duct after probing and fragments of the sac after extirpation. More infrequent

findings are internal fistulæ of the sac and fistulæ into the nose and ethmoid cells, most apt to occur in tuberculosis, either of the sac itself or of the surrounding bony structures.

X-ray has also been used to irradiate the lacrimal gland in refractory cases of epiphora, but the author's personal results with such treatment have not been very successful. Radium therapy is of great value in tuberculous diseases of the lacrimal sac. All cases were much improved and many cured; in forty-eight percent, extirpation of the sac was performed later, the operation being much facilitated by the prior radium treatment. The eyes are protected by lead plates and twenty to thirty milligram element hours of pure gamma rays used. The emanations are repeated every two weeks, as many as fifteen or twenty treatments being given.

A few cases of epiphora may be traced to errors of refraction, but this undoubtedly is a very infrequent cause. Epiphora is not necessarily synonymous with stenosis of the lacrimal passages. Many cases originated in diseased conditions of the nose and accessory sinuses. One must not forget to seek for hyperesthetic areas of mucous membrane in the nose. Scarification or cauterization of such areas may produce a prompt and spectacular cure. Slitting the canaliculi, with or without excision of part of the wound margin, is largely a thing of the past.

The treatment of stenosis is thoroughly discussed, and the various ways of probing and syringing and stricturotomy are all elucidated. Probing and syringing are useful as aids in diagnosis. None of these methods finds favor with the author as preferable means of treatment.

The medicamental treatment of chronic dacryocystitis has been practised since the earliest times. Conservative medicinal treatment is logical and should be attempted, but is successful in only a few cases. In acute purulent dacryocystitis abortive treatment is logical but the only permissible radical procedure is incision and drainage. Destruction of the mucous membrane of the chronically diseased sac by means of caustics or curetting is primitive, difficult and dangerous.

The various operations for extirpation or formation of an anastomosis between the sac and nasal cavity are described in full. It is unnecessary to review all these methods, but it might be well to quote the author's opinions in a few words: "In the operating theaters of the majority of clinics extirpation of the sac is still the ruling practice. . . . . after sac extirpation correctly carried out, most patients . . . . are as good as freed from the trouble altogether. A good extirpation is better than a poor dacryocystorhinostomy". Dacryocystorhinostomy, either external or endonasal, is the operation of choice in selected cases, but one must be assured of the skill of the rhinologist before advising his patient to have this operation performed. *A. B. Bruner.*

Ruskin, S. L. **Control of tearing by blocking the nasal ganglion.** Arch. of Ophth., 1930, v. 4, Aug., p. 208.

The author has pointed out that the tear reflex must include the nasal ganglion, both by a careful anatomical demonstration and by the clinical observation that blocking of the nasal ganglion through the posterior palatine route has resulted in a diminution of the tear secretion. *M. H. Post.*

Santori, G. **Primary adenocarcinoma of the lacrimal gland.** Ann. di Ottal., 1930, v. 58, May-June, p. 439.

The author described a rare form of tumor of the lacrimal gland found in a woman of sixty years. The histological examination showed that the neoplasm was formed of a connective tissue stroma and a parenchyma. This consisted of alveoli almost wholly filled by epithelial elements with their nuclei in atypical mitoses. The general aspect was characteristic of glandular cancer, although none of the elements of the stroma could be considered pathologic. The rapid development of the neoplasm, its clinical characteristics, its

nodular surface, its firm, elastic feel, the slight mobility of the tissues in which it was found, and its recurrence shortly after its removal, all led to the conclusion that the growth was malignant; the histology warranted the diagnosis of a rare form of adenocarcinoma of the palpebral portion of the lacrimal gland, and its origin was probably in the excretory tubules of the gland itself. (Bibliography.) *Park Lewis.*

Truc, H., and Dejean, Ch. **Median blepharotomy in the form of a reverse V, to permit vision in an occluded eye.** Soc. Franç. d'Opht., 1929, v. 42, pp. 176-180. (See Amer. Jour. Ophth., 1930, v. 13, Jan., p. 88.)

15. TUMORS

Adams, Dorothy. **A case of ring sarcoma of the iris.** Brit. Jour. of Ophth., 1930, v. 14, Sept., p. 448.

In a man, aged forty-four years, the symptoms of acute glaucoma were present at the time of the first observation. There were two dark brown pigment bands on the iris that extended from eleven o'clock around to a large patch at five o'clock. The patient had observed the enlargement of this patch during the preceding two months. The sectioned eye showed a diffuse pigment growth invading the iris, the neighboring sclera and the anterior part of the ciliary body in every section examined. (Four photomicrographs and eight references.) *D. F. Harbridge.*

Grimsdale, Harold. **Two cases of intraocular sarcoma.** Brit. Jour. Ophth., 1930, v. 14, Aug., p. 410.

A female aged fifty-four years had had her left breast removed for carcinoma eight years previous to coming under observation for loss of sight in the left eye. The eye presented a detached retina, part of which was filled with a hard mass. The sectioned eye showed a sarcoma; presumably it had no relation to the previous disease.

The second patient was a male aged seventy years with a markedly inflamed eye. The right cornea was steamy, posterior synechiæ were present and in the lower anterior chamber was a dark mass. Following treatment, the cornea and iris cleared; a definite diagnosis of tumor was then made and the eye was enucleated. *D. F. Harbridge.*

Morax, V. and Depouilly, L. **Cavernous angioma of the choroid.** Ann. d'Ocul., 1930, v. 167, July, pp. 537-550.

One case is here reported. Nineteen cases have been described. Differential diagnosis from the infinitely more frequent sarcoma of the choroid cannot be certain, but suggestive points are (1) the occurrence of the intraocular tumor in a person under twenty, (2) an associated hemiangioma of the face, or (3) the presence of a plaque of intraocular ossification as evidenced by an x-ray picture. Enucleation is indicated in either case, but the prognosis for life is certainly different.

Lawrence T. Post.

Musial, Albin. **A case of endothelioma of the eyelid.** Zeit. f. Augenh., 1930, v. 71, July, p. 347.

Because of its extreme rarity Musial describes a very large endothelioma of the lower lid edge which he successfully excised. *F. H. Haessler.*

Papolezy, F. **Sarcoma of the iris.** Arch. f. Augenh., 1930, v. 103, June, pp. 309-322.

Papolezy reports eight cases of sarcoma of the iris. He concludes that enucleation is indicated. Iridectomy is to be considered only in unusual cases where the clinical diagnosis is uncertain. Where the differential diagnosis lies between sarcoma, iris cyst, tubercle or gumma, an iridectomy can be performed. Should the histological examination of the removed iris tissue show sarcoma an enucleation must be done.

Frederick C. Cordes.

Perwog, M. **Extraorbital and intraorbital dermoid. Report of a case.** Arch. f. Augenh., 1930, v. 103, June, pp. 330-335.

Perwog reports a case of extraorbital dermoid that was treated by careful

curettement, with apparently good results. The patient returned a year later with recurrence from a deeper orbital dermoid that apparently was part of the original tumor. To guard against a possible recurrence in such cases, therefore, the author believes that careful total extirpation is indicated. Where the dermoid also extends into the orbit, this is not always possible.

Frederick C. Cordes.

Pohissov, N. I. **On the histogenesis of pigmented nevi of the conjunctiva and of the skin of the eyelids.** Russkii Opht. Jour., 1930, June, pp. 779-793.

The author examined microscopically thirty-one cases of pigmented nevus: seven cases of pigmented nevus of the conjunctiva, one of the semilunar plica, eight of the skin of the eyelids, and six of the lacrimal caruncle. In most of the specimens some connective tissue was found around the nevus cells, separating them from the rest of the epithelial layer. The latter had simple depressions corresponding to the growth of the nevus cells. No other more intimate relationship between the epithelial and the nevus cells could be detected. Pohissov, therefore, concludes that the nevus cells are of mesodermal, and not of ectodermal origin.

In some cases the pathogenesis of pigmented nevi could be traced to a hyperplasia of the endothelial cells of the lymphatic vessels. These cells later became pigmented and developed into chromatophores. A further proof of the mesodermal origin of the pigmented nevi is their malignant degeneration into melanotic sarcomata, as observed by the author in two cases.

M. Beigelman.

Verga, P. **Cystic angioreticular glioma of the optic nerve.** Riv. Oto-Neuro-Oft., 1930, v. 7, March-April, pp. 101-134.

The cadaver of a man fifty-seven years old revealed, at autopsy, a fusiform enlargement of the intracranial portion of the right optic nerve. The man died by accident. His right eye vision had been poor since infancy. The microscopic examination of the central section of the affected nerve showed numerous cavities, some of which were derived from regular blood vessels and others from tissue of a reticular nature. The cavities were either empty or full of blood or coagulated plasma, which suggested the character of a vascular tumor. All the cavities were surrounded by a gliomatous tissue. The fibers of this tissue, which take an outward direction, end either among the connective tissue fibers of the pial sheath or crowd the more or less normal optic nerve fibers to the periphery of the nerve.

The author named this tumor a cystic angio-reticular-glioma. He surveyed the literature on vascular tumors of the optic nerve. He discussed the systematized angioblastic forms found in the central nervous system; these are congenital anomalies due to embryonal malformations of the mesenchyma. The tumor described by the author is related to these angioblastomata by different angles; it is the first case of this kind to be reported in the literature. (Bibliography and fifteen figures.) *Melchoire Lombardo.*

16. INJURIES

Coppez, H. **Pseudo-foreign bodies of the eye.** Soc. Franç. d'Opht., 1929, v. 42, pp. 269-282. (See Amer. Jour. Ophth., 1930, v. 13, April, p. 366.)

Löwenstein, Arnold. **Chloroform injury to cornea with secondary cyst formation.** Klin. M. f. Augenh., 1930, v. 85, August, p. 218.

After an injury to the cornea from chloroform used in anesthesia three cysts developed at the limbus and remained for five years, when they were abscinded. The clinical picture does not correspond to that produced experimentally in rabbits where chloroform produces slight turbidity of the cornea with immediate rapid recovery. Since chloroform is a lipoid solvent it is possible that it induced a tanning of the epithelium in the region of the blebs. The fact that Bowman's membrane was destroyed suggests that this membrane is dependent on the epithelium for its

nourishment rather than on the parenchyma. *F. H. Haessler.*

Lutz, Anton. **The traumatic paralysis of the inferior oblique muscle.** Graefe's Arch., 1930, v. 123, p. 721.

A cowboy, aged forty years, was kicked in the left cheek by a steer and suffered a fracture of the left orbital floor and of the left malar bone. The only injury to the left eye was a paralysis of the inferior oblique muscle. Spontaneous improvement occurred so that six months later doubling of the images was noted only when looking extremely up and to the right. *H. D. Lamb.*

Merkulov, I. I. **The action of mustard gas on the eye.** Ukrainskii Oft. Jour., 1929, v. 1, pt. 1, pp. 93-113.

Experiments were carried out on thirty-three rabbits and two dogs, using mustard gas in dilutions of 1:1000, 1:100, and 1:10 in liquid petrolatum. The technique consisted of instillations of one, two, three, or five drops in the conjunctival cul-de-sac, each drop being equivalent to 1/40 c.c. In dilution of 1:1000, mustard gas causes a catarrhal conjunctivitis. Dilutions of 1:100 and 1:10 provoke an acute conjunctivitis, suppurative or membranous; subconjunctival hemorrhages; ulcerative blepharitis, mainly of the parenchymatous type, superficial or deep; keratitis bullosa; iritis; and iridocyclitis with hypopyon and neuritis. These ocular manifestations are stormy in onset. Conjunctivitis with chemosis and mucoid discharge make their appearance in seven to eight hours, and clouding of the cornea is seen in twenty-four hours. Hypopyon forms from four to six days after the instillation. The duration of the process in mild cases lasts three to four weeks and in the severe types seven to eight weeks. The sequelæ are scars and deformities of the lid margins and mucous membrane, corneal opacities of variable degree and staphyloma and atrophy of the eyeball.

There exists a variable susceptibility to mustard gas, not only in different animals, but in each eye of the same animal. A previous attack seems to increase the susceptibility. Mustard gas undoubtedly possesses bactericidal properties. *Joseph I. Gouterman.*

Mills, Lloyd, and Jeançon, E. C. **Unrecognized magnetic intraocular foreign bodies and their legal aspects.** Arch. of Ophth., 1930, v. 4, Aug., p. 194.

From a very large experience with intraocular foreign bodies the authors have concluded that the presence of intraocular foreign bodies is unrecognized far more than generally supposed due to poor histories, lack of routine examination, and especially failure to use the x-rays. The most trivial accident may result in the implantation of intraocular foreign bodies. Legal responsibility demands the use of the x-ray in all suspicious cases. X-ray localization should be applied in all suspected cases. All such cases should be treated as emergencies and should be handled with modern methods of asepsis. *M. H. Post.*

Panico, E. **Penetration of cilia in the anterior chamber and in the posterior chamber.** Ann. di Ottal., 1930, v. 58, May-June, p. 417.

From his observed cases and experiments on rabbits the author concludes that cilia in either the anterior or posterior chamber give rise to two orders of phenomena. It may be infective, or benign, and resolution will occur in a week. It may, by the action of the cilia on the iris, cause a traumatic irritation which can also disappear in a short time without leaving permanent effects. The removal of such a foreign body is often simple; at other times it is very difficult, especially if it lies in the posterior chamber or is adherent to the crystalline lens. It may seriously complicate an already traumatized eye.

The cilium may remain for a long time in either chamber; sometimes it will give rise to a secondary neoplasm with cyst of the iris. (Bibliography.)

Park Lewis.

Scotti, P. **On the functional alterations in the iris and ciliary body follow-**

ing contusions of the globe. Ann. di Ottal., 1930, v. 58, May-June, p. 491.

The conclusions which the author reaches after making a series of clinical experimental studies are that contusions of the globe, aside from direct lesions of the tissues, cause changes in the form and functions of the ciliary body and iris which are indicated first by dilatation and then by contraction of the pupil, accompanied by paralysis or by spasm of the ciliary muscle. No clinical element accounts for this opposite action following contusion of the eyeball. The posttraumatic paralysis, which has no local origin, could be caused by a direct or indirect lesion of the ciliary ganglion and the short ciliary nerves from the ocular commotion. The first hypothesis is the more likely in those cases in which the lesion is in the fundus and is of long duration. The miosis and accommodative spasm could depend on excitation of the sphincter fibers with engorgement of the iris vessels and ciliary vessels. Such injuries, however, are of short duration and do not affect the functional action permanently. Indirect lesions of the fundus, which sometimes accompany those of the iris and ciliary body, do not influence the clinical course of this condition even when they are etiologically coincident. Experimentally, mydriasis has never been produced, but only miosis of varying degrees, and this is dependent on the vascular congestion of the iris. *Park Lewis.*

Tiscornia, Atilio. **Foreign body floating in the vitreous.** Arch. de Oft. de Buenos Aires, 1930, v. 5, May and June, p. 201.

While hammering a piece of bronze six months previously the patient felt a sudden twinge of pain in the right eye; attributing this to a drop of oil, he continued working. Five months later a distinct diminution was noted in the vision of that eye; the vision grew slowly worse. At the time of examination vision was 1/50.

There was a corneal scar at about the two o'clock position near the limbus, the posterior surface showing cellular deposits. There was slight ciliary injection, but the pupil was normal in appearance and reactions. The iris was slightly discolored in comparison with its fellow. There were superficial opacities on both the anterior and the posterior surfaces of the lens, all in prolongation with the corneal wound. In the pupillary area was a brilliant reddish yellow reflex, freely movable with the vitreous. This proved to be the bronze particle, and it was clearly visible and readily localized with the Sweet x-ray technique. As it was nonmagnetic, only a direct extraction was possible.

A transverse incision was made near the insertion of the external rectus, and the patient was placed so that light could be reflected through the wound directly into the vitreous cavity. The particle was thus easily localized and removed by fine forceps, followed by a small amount of vitreous. The piece weighed 0.0009 gm. Eight days later vision had improved to 1/20, and the corneal precipitates were no longer visible. After fifteen days the vision was 1/10, which is still maintained after an interval of six months.

A. G. Wilde.

17. SYSTEMIC DISEASES, AND PARASITES

Borghesan, E. **A case of craniopharyngeal tumor with bilateral paralysis of cranial nerves.** Riv. Oto-Neuro-Oft., 1930, v. 7, May-June, pp. 197-212.

The author described a case of craniopharyngeal tumor in a woman forty-four years old. Among other general symptoms she had bilateral exophthalmos, ptosis, total ophthalmoplegia and amaurosis, and unilateral left neuroparalytic keratitis. The patient died with symptoms of bulbar paralysis. The tumor, at the microscopic examination, was diagnosed as a basal-celled epithelioma. It originated in the rhinopharyngeal region and grew into the cranial cavity through the sphenoid sinus and the posterior ethmoid cells. It invaded the brain sub-

stance of the middle and posterior fossæ. The progress could be estimated by the chronologic appearance of the symptoms. The radiographic localization of the tumor, during the patient's life, was confirmed at autopsy. (Bibliography and six figures.)

Melchiore Lombardo.

Bryn, Arne. **A case of oculoglandular tularemia.** Klin. M. f. Augenh., 1930, v. 85, July, p. 61.

The author describes a typical case of this disease. He feels that since the whole clinical picture has been clearly outlined we can no longer isolate the ocular symptom complex and call it Parinaud's disease. One should adopt the American name, oculoglandular tularemia. Since the agglutination test has been devised one should have no further difficulty in defining the limits of the clinical entity. Furthermore, Pascheff's conjunctivitis necroticans infectiosa also is probably tularemia.

F. H. Haessler.

Del Duca, M. **Hepatic therapeutics in the ocular lesions of pernicious and perniciform anemia.** Ann. di. Ottal., 1930, v. 58, May-June, p. 427.

In this work are reported observations made on eight patients affected with anemia perniciosa cryptogenetica and with the perniciform anemia consecutive on malaria and lues, which present all of the retinal and papillary lesions found in the idiopathic disease. All of the patients were put on hepatic therapeutics, either in the form of the fresh liver or of the liver extract, and in all of them the result was a rapid improvement in the general symptoms and consecutive betterment of the fundus lesions. *Park Lewis.*

Gillett, H. M. **Infections of the mouth and their relation to diseases of the eye.** Arch. of Ophth., 1930, v. 4, August, p. 228.

Any focus of infection in the mouth may lead to ocular infection. Those most commonly found are vital tooth pulps, apical areas, periodontoclasia areas, and impacted teeth. Negative x-ray examination of pulpless teeth does not exclude infection. If other sources are absent, then infected, though vital, pulps should be looked for. Especially is this true in the presence of streptococcus infections, even in the absence of the local pain. The lymph and blood circulation appear to be the probable course of such infections. *M. H. Post.*

Gomez Marquez, J. **Ocular tuberculosis, typical and atypical.** Arch. de Oft. Hisp.-Amer., 1930, v. 30, Jan., p. 17.

The author believes that cases of ocular tuberculosis in which a positive bacteriological and pathological diagnosis can be made are very rare. There are no immunologic reactions which permit such a diagnosis without endangering the eye, so it is only by exception that a true and complete diagnosis is feasible. There are two great groups of tuberculous changes in the eye: (1) Typical tuberculosis in which the demonstration of the bacillus and characteristic histological lesions is possible. These cases are usually active, widely spreading and destructive processes, similar to common pulmonary tuberculosis. (2) A group of atypical cases, some of them considered as suspicious and others doubtful, whose course is benign and which have a spontaneous tendency to recovery. They are seen in scrofulous or apparently healthy persons and are similar to Bernard's atypical tuberculosis or to Poncet's inflammatory tuberculosis.

The difference between these two groups is the same as in Koch's original experiment. Inoculation of tubercle bacilli into a healthy guinea pig produces an ulcer which persists until death, while the same inoculation made into an already tuberculous animal causes in twenty-four to forty-eight hours a very marked inflammatory reaction, followed by necrosis and then complete healing. This means that in the second case the animal is in an allergic condition and is able to eliminate the products of the inoculation.

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In this second category of patients, especially in phlyctenular keratoconjunctivitis of the severe relapsing type, the author has successfully used Spengler's immunizing bodies, which are an extract of red blood corpuscles made from the blood of highly tuberculous animals. He resorted first to injections, but afterwards gave the extract by mouth with the same results. It is necessary to be certain that no active tuberculous focus is present, especially in the lungs. The patient's temperature being normal the author uses Ferran's immunizing solution no. 7 and continues it while there is no fever and the weight of the body increases. Then solution no. 6 is prescribed. The author claims that healing is very rapid and no relapses occur.

In the first group of patients with confirmed ocular bacillosis, as in certain cases of keratitis and severe choroiditis, the result with immunizing bodies is not so good, and it is better to use "sanocrisin" which the author has found superior to the tuberculins commonly employed. He has treated about 100 patients by intravenous injection of sanocrisin and found it useful in the torpid types of keratitis and iridocyclitis which are clinically tuberculous. It is better not to exceed a dose of 50 cgm. The treatment should not be employed when the kidneys are diseased. *M. Uribe Troncoso.*

Klar, J. **Eye symptoms in a case of myasthenia with thymus tumor.** Klin. M. f. Augenh., 1930, v. 85, August, p. 224.

The author observed the typical picture of myasthenia gravis with periodic remittent, intermittent course, ptosis, paralysis of the external eye muscles, and involvement of the frontal, facial, bulbar and respiratory muscles. The thymus tumor was a lympho-epithelioma without signs of malignancy. The muscle lesions were in no way similar to the tumor. *F. H. Haessler.*

Kyrieleis, Werner. **The occurrence of multiple abscesses in the optic nerve in streptoccoccus sepsis.** Klin. M. f. Augenh., 1930, v. 85, August, p. 194. (See Section 11, Optic nerve and toxic amblyopias.)

Lawson, Arnold, Young, R. A., Browning, S. H., and others. **Discussion of the diagnosis and treatment of ocular tuberculosis.** Trans. Ophth. Soc. United Kingdom, 1929, v. 49, p. 45.

This symposium gives a general review of our present ideas regarding the diagnosis and treatment of ocular tuberculosis. Each contributor seems to offer a few of his personal ideas and experiences with no attempt made to give a general summary. The same ground has been thoroughly covered by recent articles in our American periodicals. *A. B. Bruner.*

Steinbugler, W. F. C. **Dental infection in diseases of the eye.** Arch. of Ophth., 1930, v. 4, Aug., p. 220.

In this paper the author considers carefully and in some detail the great mass of work that has been done on dental infection in its influence on diseases of the eye. He concludes that there is no definite clinical picture resulting from dental infections. Focal infections, for the most part dental lesions, are next to syphilis and tuberculosis in importance as causative agents in ocular pathology. Improvement should take place within forty-eight hours if the true seat of infection has been eliminated. Conservatism should be practiced, but a tooth should be sacrificed rather than an eye. *M. H. Post.*

18. HYGIENE, SOCIOLOGY, EDUCATION, AND HISTORY

Kantor, D. **On the minimum visual acuity of chauffeurs and on the admissibility of the use of corrective glasses when driving an automobile.** Russkii Opht. Jour., 1930, June, pp. 760-766.

According to the government regulations of 1929 in Soviet Russia, a qualified chauffeur must have a visual acuity of not less than 0.75 in each eye. The author discusses the visual standards established for automobile drivers in Germany and Italy, as well as the corresponding French and Belgian project

of Jeandely and Weeker. He concludes that the total visual acuity of both eyes for safe driving should be not less than 1.4, with a minimum of 0.5 in the weaker eye. In the presence of any diseased condition affecting the visual acuity, the visual acuity must subsequently be tested every three months. Persons who need a correction of the refractive error in order to qualify for a driver's license must be, when driving, in the possession of an additional pair of glasses for emergency purposes.

M. Beigelman.

NEWS ITEMS

News items in this issue were received from Drs. C. A. Clapp, Baltimore; E. D. Le Compte, Salt Lake City; and G. Oram Ring, Philadelphia. News items should reach **Dr. Melville Black,** Metropolitan building Denver, by the twelfth of the month.

Deaths

Professor Ernst Fuchs died in Vienna on November twenty-first of angina pectoris, at the age of seventy-eight years.

Dr. James R. Davey, Chicago, aged seventy-one years, died September sixteenth of angina pectoris.

Dr. Fred Fisher, Jr., Erie, Pennsylvania, aged thirty-nine years, died September second of acute appendicitis.

Dr. James Madison Woodson, Temple, Texas, aged sixty-two years, died suddenly, September thirtieth, of heart disease.

Dr. Derrick Tilton Vail, Sr., Cincinnati, died of heart disease, October twenty-ninth, at the age of sixty-six years.

Salvatore Calderaro, director of the eye clinic of the University of Catania, died in that city on July thirtieth. He was a collaborator of the Annali di Ottalmologia e Clinica Oculistica.

Émile Valude, one of the directors of the Annales d'Oculistique, died recently after a long illness. He had been associated with the Annales for almost forty years.

Miscellaneous

The Manhattan Eye, Ear, and Throat Hospital, New York, has been left $100,000 by the will of Lloyd W. Seaman.

The first Mexican Congress on the Prevention of Blindness was held in Mexico City, November 1 to 6, under the auspices of the departments of public education and public health and of the National University of Mexico City.

Nineteen physicians of Memphis, Tennessee, specializing in the eye, ear, nose, and throat, have organized a holding company known as the Meenath Corporation for the purpose of insuring the operation of the Memphis Eye, Ear, Nose, and Throat Hospital. The incorporators have agreed to support the hospital in order to carry on the good work of the institution.

One hundred and twenty-five cases of trachoma were discovered in southern Illinois, in a series of clinics sponsored by the United States Public Health Service, the Illinois Society for the Prevention of Blindness, and the State Department of Public Health. The State Department of Health has recently appointed a full-time nurse who will promote the care of patients and follow up cases.

According to rumor there has recently been a good deal of agitation against American physicians who have been working in the Budapest hospitals; this agitation having been stirred up by assistants, interns, and externs in the hospitals, who seemed to think that they were losing the financial return from operative work done by the Americans in association with professors who in their turn were reaping a harvest of American dollars from the postgraduate pupils with whom they were under contract. A Budapest woman lately started suit against a local hospital on account of an operation for gastric ulcer said to have been performed by an American doctor who was not adequately skilled in such work.

Sight-saving classes: The National Society for the Prevention of Blindness has issued the following suggestions as to finding potential sight-saving-class pupils and forwarding them for ophthalmological opinion:

1. General qualifications include children having a visual acuity of 20/70 or less in the better eye after proper refraction. In addition, the following are recommended as potential candidates:

(A) Children in elementary schools who have four or more diopters of myopia.

(B) Inactive, subsiding (or regressive) cases, such as interstitial or phlyctenular keratitis, optic neuritis, or trachoma, in which some irritation may be present, provided the approval of the attending physician is given.

(C) Any child who in the opinion of the ophthalmologist would benefit by assignment to a sight-saving class, subject to such ophthalmologist's suggestions for treatment and training, and acceptance by the educational authorities having charge of such classes.

It is assumed that all the children assigned to sight-saving classes have average normal mentality. All classes must be considered individually.

Societies

The next meeting of the American Ophthalmological Society will be held at Asheville, North Carolina, June 1 to 3, 1931.

NAME INDEX

Explanation: Numbers in heavy type refer to original articles, parenthetic numbers to abstracts

The tenth annual session of the eye, ear, nose, and throat section of the Kentucky State Medical Association was recently held at Louisville. Dr. John F. Barnhill, Indianapolis, was the guest of honor.

The 165th anniversary of the founding of the medical department of the University of Pennsylvania was marked by a two-day celebration, on October tenth and eleventh. A number of honorary degrees were conferred upon a group of distinguished clinicians, and in the evening of Friday, October tenth, a banquet was held at the Benjamin Franklin Hotel, at which Dr. George E. de Schweinitz, emeritus professor of ophthalmology and one of the trustees of the University, acted as toastmaster.

The thirty-fifth annual meeting of the American Academy of Ophthalmology and Otolaryngology, which recently took place in Chicago, was the most largely attended and one of the most successful in the history of the Society. Nine hundred and fifty-one members and guests were registered. The instructional course continues to be one of the most attractive features of the Society, and the Society is again indebted to Dr. Gradle for his work in the preparation of the instructional program. Dr. Émile de Grosz, Budapest, was the guest of honor and proved to be a most entertaining and scientific gentleman. The president, Dr. William H. Wilder, and the secretary, Dr. William P. Wherry, had worked very hard to make the meeting a success. The officers are: president, Dr. John F. Barnhill, Miami Beach, Florida; president-elect, Dr. S. Hanford McKee, Montreal; first vice president, Dr. Meyer Wiener, Saint Louis; second vice president, Dr. J. W. Carmack, Indianapolis; third vice president, Dr. Ben Witt Key, New York City; comptroller, Dr. Secord H. Large, Cleveland; executive secretary-treasurer, Dr. William P. Wherry, Omaha; secretary for ophthalmology, Dr. William L. Benedict, Rochester, Minnesota; secretary for otolaryngology, Dr. John L. Myers, Kansas City, Missouri; secretary for instruction, ophthalmology, Dr. Harry S. Gradle, Chicago; secretary for instruction, otolaryngology, Dr. William V. Mullin, Cleveland; editor of transactions, Dr. Arthur W. Proetz, Saint Louis; associate editor, Dr. Lawrence T. Post, Saint Louis. Life membership was conferred upon Dr. J. H. Allen, Denver; Dr. C. W. Kollock, Charleston, South Carolina; Dr. Grant Selfridge, San Francisco; Dr. T. B. Schneideman, Philadelphia; Dr. Otto J. Stein, Chicago; Dr. H. B. Young, Burlington, Iowa. Honorary membership was conferred upon Professor Dr. Émile de Grosz, Budapest, Hungary (guest of honor). The examination of candidates by the Ophthalmic Examining Board was conducted at the Illinois Charitable Eye and Ear Infirmary. There were twenty-five candidates. The next meeting of the Academy will be held at French Lick Springs, Indiana, September 14 to 19, 1931.

Personals

Dr. Harry Friedenwald, Baltimore, has returned from a summer abroad.

In October, Miss Ida Mann gave three lectures at the Wilmer Institute upon the "development of the human eye".

On October twentieth Professor de Grosz gave a lecture at the Wilmer Institute upon the "operative treatment of glaucoma and cataract".

Dr. Charles Zimmerman of Milwaukee, Wisconsin, has returned from a three months' trip to Europe, during which he visited various eye clinics of Munich, Vienna, and London.

Dr. Franklin H. Raley has been elected president of the Utah Ophthalmological Society and Dr. W. LeRoy Smith its secretary-treasurer.

An announcement has been received of the marriage of Dr. Maurice E. [illegible]ove, Denver, to Miss Gertrude Rosenberg of that city.

Dr. Nelson M. Black has removed his office permanently from Milwaukee to Miami, Florida, where his address is 703 Huntington Building.

Drs. Gifford, Callfas, Potts, Cassidy, Judd, and Fairchild, of Omaha, announce that Dr. William H. Stokes is now associated with them in ophthalmology.

The Physicians' Club of Taylorville, Illinois, was addressed September twenty-fourth by Dr. Perry E. Duncan of Chicago on "eye injuries".

Professor J. Van der Hoeve of Holland has been awarded the William [illegible]Kenzie medal for "original contributions to ophthalmology of outstanding merit".

On August first Dr. Le Roy Thompson of Chicago was appointed chief of staff of the Illinois Charitable Eye and Ear Infirmary by Governor Emerson, succeeding Dr. William L. Noble; and Dr. James L. Smith was appointed superintendent to succeed Dr. Leo Steiner.

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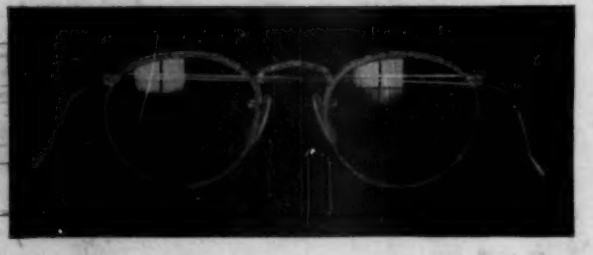

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